AMERICAN GAS ASSOCIATION MONTHLY

Overseas Delegation in United States Sees Gas at Work in Nine Cities

What Price New Business?

MORSE DELLPLAIN

Position of Gas Industry in France

A. BARIL

Observations of Trees Near Gas Leaks

CARL G. DEUBER

New Basic Data on High Temperature Combustion

E. E. McCORMICK

"Home of Controlled Climate" Made Possible With Gas

November, 1933

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A Handbook for Design and Construction

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Foreign Visitors Stop Off at A.G.A. Laboratory

IN their tour of the United States, members of the Overseas Delegation to the International Gas Conference and Fifteenth Annual Convention of the American Gas Association visited Cleveland, Ohio, where a thorough inspection of the A.G.A. Testing Laboratory was made. A group of the men in the party is shown in the above picture, which was posed at the Laboratory entrance. In the circle, are shown the ladies of the delegation and members of the Cleveland Entertainment Committee. This picture was taken at the entrance to the Cleveland Art Museum.

AMERICAN GAS ASSOCIATION MONTHLY

Allyn B. Tunis, Editor

VOLUME XV | NOVEMBER, 1933 | NUMBER 11

Overseas Delegation Sees Gas at Work In 9 U. S. Cities

OVERSEAS delegates who attended the International Gas Conference and Fifteenth Annual Convention of the American Gas Association, at Chicago, in September, formed the largest group of foreign gas industry officials ever to visit this country. Before and after the Chicago Conference, the visitors, many accompanied by their wives, were entertained by gas companies and trade associations in Mid-Western and Eastern cities.

In the nine cities visited the delegation was given every opportunity to inspect American gas plants, and when they returned to their homes, in October, most of them carried with them a true picture of the industry in this country.

This group of executives and engineers represented the International Gas Union; the Institution of Gas Engineers, London, England; the French Technical Gas Association; National Gas Council of Great Britain and Ireland; Irish Association of Gas Managers; Society of British Gas Industries, North British Association of Gas Managers; Imperial Gas Association of Japan; British Refractories Research Association; and Italian Gas and Water Association.

Visit Detroit First

After a tour of Canadian cities, during which they attended the annual convention of the Canadian Gas Association, at Ottawa, the visitors detrained first in the United States at Detroit, Mich., on September 23.

Before reaching Detroit the train bearing the visitors was boarded at St. Thomas by J. W. Batten, vice-president and assistant general manager and Adam Kurtz, Controller of the Detroit City Gas Company, and they acted as official escorts to the party which was welcomed upon arrival by the British Consul and his family, C. S. Ritter, treasurer; A. I. Snyder, chief engineer; A. H. Anderson, superintendent in charge of distribution, and L. K. Ritchie, assistant engineer in charge of distribution of the Detroit company.

After a sight-seeing tour about Detroit, the Ford Motor Company plant was visited. Special arrangements had been made for inspection of the Ford Company's coke oven and power plants. Upon conclusion of the visit to the Ford plant, representatives of the Detroit company were hosts at a tea at the Hotel Statler. It was upon this occasion that Frank P. Tarratt, president of The Institution of Gas Engineers, made his first address of the visit. Others who spoke included Hon. L. S. Hughes-Hallett, British Consul at Detroit, and C. W. Bennett, vice-president and general manager of the Detroit City Gas Company.

Leave for Chicago

At Detroit the group entrained for Chicago, arriving there early September 24, and were met by members of the Entertainment and Reception Committee, including Arthur Hewitt, C. E. Paige, Alexander Forward and H. Leigh Whitelaw.

The visitors found a complete program of activities. Small groups were taken to desired points of interest and on September 26, the visitors were officially welcomed by Rufus C. Dawes, president of A Century of Progress Exposition and Geo. F. Mitchell, president, The Peoples Gas Light and Coke Company of Chicago. This ceremony opened the International Gas Conference and took place as International Gas Industry Day was observed at the Exposition.

In the evening the members of the delegation were guests at the President's reception—always an outstand-

Scene at luncheon tendered Overseas Visitors by The Peoples Gas Light & Coke Co., in the Administration Building, Century of Progress Exposition, Chicago, Ill., September 28

ing event at American Gas Association conventions. Members of the group also took part in business sessions of the conference and convention.

One of the features at the General Session on September 26 was the presentation of a salver to the president and members of the American Gas Association by the president and members of the Institution of Gas Engineers. The presentation was made by Mr. Tarratt and received with appropriate remarks by Arthur Hewitt, president of the American Gas Association. The salver is inscribed as follows:

"Presented, as a token of affection, to President Arthur Hewitt and the Members of the American Gas Association by President Frank P. Tarratt and the Members of The Institution of Gas Engineers attending the International Gas Conference and the 15th American Gas Convention at Chicago from 25th to 28th September, 1933, during the Visit of the Institution to the United States of America and Canada."

The gift has been framed and is now installed at American Gas Association Headquarters as a prized memento of the visit of the overseas delegates to the United States.

While in Chicago, visiting ladies were entertained at tea, a dance, and treated to a sight-seeing tour along Lake Michigan.

One of the interesting events at Chicago was a luncheon tendered the visitors by The Peoples Gas Light and Coke Company in the Administration Building at the Fair Grounds.

The committee in charge of arrangements and entertainment of the foreign delegates at Chicago was as follows:

B. J. Mullaney, Vice-President, The Peoples Gas Light & Coke Company, Chairman; H. W. Hartman, American Gas Association, New York, N. Y., Secretary; C. N. Chubb, Executive Vice-President, United Light & Traction Company; H. C. Cummins, Vice-President of Operation, Byllesby Engineering and Management Corp.; R. B. Harper, Vice-President, The Peoples Gas Light & Coke Company; T. G. Janney, Vice-President, Chicago By-Product Coke Company; John G. Learned, Vice-President, Public Service Co. of Northern Illinois; W. G. Murfit, Com. Manager, The Philadelphia Gas Works Company, Philadelphia, and W. A. Sauer, Vice-President and General Manager, Midland United Company.

Salver presented by the President and Members of The Institution of Gas Engineers to the President and Members of the American Gas Association

Ladies' Committee—Mrs. George F. Mitchell, Chairman; Mrs. Britton I. Budd, Mrs. Morse DellPlain, Miss Elizabeth B. Canavan, Mrs. George Corson Ellis, Mrs. Robert B. Harper, Mrs. William H. Hodge, Mrs. T. G. Janney and Mrs. J. M. Roberts.

Inspect A. G. A. Laboratory

Cleveland, Ohio, home of the American Gas Association Laboratory, was the stopping point of the visitors September 29. A thorough inspection of the Testing Laboratory, a luncheon at the Cleveland Chamber of Commerce and a trip to the Otis Steel Company Riverside plant were features of this visit.

After breakfasting at a downtown hotel, the men were taken to the A. G. A. Testing Laboratory by special buses and later to visit the Nela Park model kitchens and laboratories. The ladies in the overseas party were escorted in private cars on a sight-seeing tour of the city. At the Laboratory the visitors were told of the history, development, and activities of the establishment, shown in detail each department in full operation, and supplied with all pertinent literature concerning the Laboratory's testing and research operations. At Nela Park the school of lighting and model kitchens aroused considerable interest.

At 1 P.M., both the ladies' and men's groups met at the Cleveland

Chamber of Commerce, Terminal Tower, where luncheon was served. R. W. Gallagher, president of the East Ohio Gas Company, and past president of the American Gas Association, acted as toastmaster, introducing Edgar Bowersfind, representing the Mayor of the City of Cleveland, and Munson Havens, executive secretary of the Cleveland Chamber of Commerce, both of whom extended cordial welcomes to the delegates from the people and business interests of Cleveland. Mr. Tarratt and A. Baril, past president of the French Technical Gas Association and vice-president of the International Gas Union, were also introduced by Mr. Gallagher and they gave brief talks concerning their impression of America and the American gas industry.

Mr. Gallagher, in addressing the group, first outlined the development of Cleveland to its present position of industrial prominence, stressing Cleveland's vast interests in steel production (both smelting and finishing processes), textiles and clothing, machine work (both rugged and precise), and automobile accessories manufacture. From this to a discussion of the natural gas industry was but a step in view of the fact that Cleveland may lay claim to being the birthplace of the now imposing natural gas industry of the United States. It was pointed out that in 1896 the East Ohio Gas Company undertook the piping of natural gas to Akron and Canton through a 10-inch pipe line from the West Virginia fields. It was not thought possible to supply a city as large as Cleveland was at that time with natural gas. In later years, however, a pipe line was built through to Cleveland, and today the entire Cleveland area is supplied with natural gas, the majority of which comes from the West Virginia fields. Mr. Gallagher further referred to the tremendous progress which has been made in recent years in the long-distance transmission of natural gas, stating that a network of natural gas transmission lines now extends into every well populated section of the United States. Reference was made to the 1,000 mile pipe line from Texas to Chicago as an example of the developments in this direction.

Reference was also made to the extensive use of natural gas in the United States for house heating, industrial, and commercial purposes. The high heating value and low cost of natural gas has made the use of this most desirable fuel within the economic means of millions of people of the United States and Canada. The speaker in closing referred to the many uses of natural gas in industry and stated that the industrial developments of the United States had more or less followed developments in the gas industry.

Guests of English-Speaking Union

Following the luncheon, the delegates were given a view of the city from the observation platform of the Terminal Tower. The ladies were later entertained at a matinee performance at the Palace Theater followed by tea as guests of the English-Speaking Union of Cleveland. The men, on the other hand, were further introduced to industrial Cleveland by an inspection tour of the Otis Steel Company, Riverside Plant. Here they witnessed American methods of steel mill operation at a plant consuming 6,000,000 cu.ft. of natural gas daily in the rolling of steel plate from ingots.

Shortly before 7 P.M. the overseas group boarded their train for Pittsburgh.

The following committee was in charge of arrangements in Cleveland:

C. E. Gallagher, Assistant General Manager, The East Ohio Gas Company, Chairman; R. M. Conner, Director, A. G. A. Testing Laboratory, Secretary; F. J. Cotton, Frigidaire Corp., Dayton, Ohio; Karl Emmerling, Ind. Fuel Engr., The East Ohio Gas Company; W. G. Hagan, General Superintendent, The East Ohio Gas Company; D. E. Maloney, Assistant Director, Pub. Rel., The East Ohio Gas Company; James Shanks, The East Ohio Gas Company, Cleveland; W. E. Steinwedell, Jr., The Gas Machinery Company and F. R. Wright, A. G. A. Testing Laboratory.

Ladies' Committee—Mrs. R. M. Conner, Chairman; Miss Doclie Gallagher, Miss Ono Furman, Mrs. Flora B. Frey and Mrs. W. G. Hagan.

Souvenirs at Pittsburgh

The party arrived in Pittsburgh Friday evening, September 29.

The following day the men in the party were taken to the plant of the Davison Coke & Iron Company on Neville Island. The ladies were driven around the city and entertained by Mrs. George W. Ratcliffe, Mrs. Joseph Becker, Mrs. Ragner Berg, Mrs. S. J. Brendel, Mrs. T. B. Gregory, Mrs. Ruth M. Gregory, and Mrs. W. F. Rockwell.

All met at the Allegheny Country

While in Washington, D. C., the Overseas Delegation visited Arlington Cemetery where wreaths were placed upon the Tomb of the Unknown Soldier

Club, at Sewickley, where luncheon was served. An attractive souvenir pamphlet was presented to each of the persons present at the luncheon. This pamphlet contained the luncheon menu, a description of the proposed trip around Pittsburgh and the names of the visiting delegates and their ladies, and the names of the Pittsburghers who entertained them. They seemed much pleased with the pamphlets and took them with them as souvenirs of their visit to Pittsburgh.

C. J. Ramsburg, vice-president of The Koppers Company, presided at the luncheon and introduced Dr. T. S. Baker, president of Carnegie Institute of Technology and Dr. Edward R. Weidlein, director of Mellon Institute of Industrial Research. Both made short and appropriate talks. Messrs. Tarratt and Baril were called on for short talks and they expressed great appreciation for the entertainment they had received in this country and particularly in Pittsburgh.

After the luncheon the party was driven to the Coal Research Laboratory of the Carnegie Institute of Technology and the Mellon Institute of Industrial Research, after which they were driven around the beautiful Civic Center in the Oakland District of Pittsburgh and then returned to their hotel.

The party left Pittsburgh for Washington, D. C., late Saturday evening, September 30.

The Pittsburgh committee on arrangements was as follows:

C. J. Ramsburg, vice-president, The Koppers Company, chairman; S. W. Meals, president, Carnegie Natural Gas Company; F. R. Phillips, president, Equitable Gas Company; G. W. Ratcliffe, president, Manufacturers Light & Heat Company; F. F. Schauer, vice-president and general manager, Equitable Gas Company; J. B. Tonkin, president, Peoples Natural Gas Company and Pennsylvania Natural Gas Men's Association.

Visit Tomb of Unknown Soldier

At the National Capital, Sunday, October 1, the visitors put in a full day of sight-seeing and were entertained at several social functions.

The Folger Shakespearian Library was visited, this institute being opened especially at the request of the British Embassy. It was the first time in its history that the Library was open on Sunday.

H. O. Chalkley, Commercial Counsellor, C. H. Cane and L. McCormick-Goodhart, Commercial Secretaries of the British Embassy, accompanied the delegaton to the Library where they were met by William H. Slade, director, who personally conducted them through the building.

Members of the French group visited the French Chancery where they were greeted by the French Ambassador. The British delegates were received by F. D. G. Osborne, the Counsellor of the Embassy, assisted by Captain A. R. Dewar, Naval Attache, who received in the absence of the Ambassador, who was then on the high seas.

One of the outstanding features of the stay in Washington was a visit to the Tomb of the Unknown Soldier in Arlington Cemetery. Two wreaths were placed upon the tomb—one by Mr. Tarratt and one by Mr. Baril.

After the sight-seeing trip the Washington committee entertained the visitors at tea.

Members of the Washington committee follow:

M. L. Sperry, president, Washington Gas Light Company, Chairman; G. W. Bean, American Gas Association, Washington, D. C., Secretary; H. M. Brundage, Jr., general sales manager, Washington Gas Light Company; Edgar Morris, Morris Sales Company, Washington, D. C.; Leon Ourusof, manager, utility department, Washington Gas Light Company; J. P. Kirkpatrick, Washington Manager, Ruud Manufacturing Company and W. H. Gill, commercial manager, Washington Gas Light Company.

Inspect First Gas-Lighted Building in U. S.

On Monday, October 2, members of the delegation visited Baltimore. The Consolidated Gas Electric Light and Power Company acted as host to the visitors, and the program was arranged by a committee consisting of H. A. Wagner, president, as chairman, C. M. Cohn, vice-president, as vice-chairman, and H. R. Cook, Jr., J. H. Wolfe, and L. B. Wilson, Jr.

On arrival at Union Station the visitors were met by Baltimore engineers and taken in two large motor buses for a tour of inspection to the Spring Gardens gas plant, the show rooms in the Lexington Building, and the distribution offices at Front Street. The route followed had been carefully planned so as to exhibit all of the operations in detail and to point out particularly certain features of especial interest.

A visit was also made to Peale's Museum, which was the first building in America to be lighted with gas. It was in this building that the first gas company in America, known as the Baltimore Gas Light Company, was organized, in 1816, and the present Consolidated Gas Electric Light & Power Company is a direct descendant of that company, and gas service to the city of Baltimore has continued without interruption since the original company first started operations.

Special arrangements were made, and some of the visitors took advantage of the opportunity to devote their entire stay to investigating the commercial and accounting activities of the company. Some of the visitors also took opportunity to visit the plants of local companies allied to the gas industry, including the Bartlett Hayward Company, the Maryland Meter Works and the Standard Gas Equipment Corporation, and the managements of these companies conducted the visitors through their plants.

While the men were engaged on the tour of inspection, the ladies were taken by some local ladies on a drive through the country surrounding Baltimore, including, of course, a visit to Loch Raven. The entire group met at the Baltimore Country Club for a luncheon tendered by the Consolidated Gas Electric Light & Power Company, where Mayor Howard W. Jackson welcomed the visitors, after which Charles M. Cohn, vice-president, expressed his pleasure at having the visitors in Baltimore. After luncheon, a trip was made to Johns Hopkins University, where Dr. W. J. Huff, professor of gas engineering, explained the work he has been doing, not only in the gas engineering course, but also in research work pertinent to gas production. Finally, a short visit was paid to some of the principal points of interest in the suburbs and in the city, the delega-

tion arriving at Union Station in the evening in time to take the train for Philadelphia.

Members of the Baltimore committee follow:

H. A. Wagner, president, Consolidated Gas Electric Light & Power Co., Chairman; C. M. Cohn, vice-president, Consolidated Gas Electric Light & Power Co., Vice-Chairman; H. R. Cook, Jr., general superintendent, gas operating division, Consolidated Gas Electric Light & Power Company; J. H. Wolfe, superintendent, gas manufacturing, Consolidated Gas Electric Light & Power Company; and L. B. Wilson, Jr., assistant superintendent, gas and steam distribution, Consolidated Gas Electric Light & Power Company.

Greeted by Philadelphia's Mayor

Upon their arrival in the Quaker City the visitors were entertained at luncheon at the Barclay as guests of Mayor J. Hampton Moore and the Philadelphia Chamber of Commerce. At this luncheon the visitors were addressed by Mayor Moore and John E. Zimmermann, president of The United Gas Improvement Company, while Philip H. Gadsden, president of the Chamber of Commerce and vice-president of The United Gas Improvement Company was toastmaster.

Mayor Moore in his address called attention to the historic importance of Philadelphia and the part played by it in the birth of the Nation and the position it has always held as a cultural center. He also called attention to the fact that the Philadelphia Gas Works is owned by the City of Philadelphia and congratulated The United Gas Improvement Company on its operation of the plant and the good service rendered to the public.

Other speakers at the luncheon were Messrs. Tarratt and Baril.

While in Philadelphia the visitors divided into groups and visited the several plants, sales offices and other offices of the Philadelphia Gas Works Company, and were entertained by Mr. and Mrs. Clarence H. Geist at Launfal, their home in Villa-Nova. Mr. Geist is a director and member of the Executive Committee of The United Gas Improvement Company.

John B. Klumpp, consulting engineer, Philadelphia Gas Commission, was chairman of the Reception Committee, which included C. N. Lauer, president, Philadelphia Gas Works Company; P. H. Gadsden, vice-president, The United Gas Improvement Company; C. H. Geist, C. H. Geist & Co., Philadelphia, Pa.; F. M. M. Oliver, vice-president, Philadelphia Gas Works Company; H. B. Bryans, vice-president, Philadelphia Electric Company; W. H. Earle, vice-president, Philadelphia Coke Company; C. A. Schlegel, sales manager, United Engineers & Constructors, Inc., and J. A. Perry, The United Gas Improvement Company.

Greater New York Gas Companies Are Hosts

The visitors came to New York City following their entertainment at Philadelphia and were greeted by a committee of which C. E. Paige, vice-president of The Brooklyn Union Gas Company, Brooklyn, N. Y., was chairman. Three days were spent in New York and all gas companies in the metropolitan area, the American Gas Association and manufacturers joined as hosts.

One of the outstanding features of their stay in Gotham was a dinner at the Waldorf-Astoria Hotel. At this time the overseas delegation was welcomed by Mr. Paige and appropriate responses were made by leaders of the French and British groups. Among other talks was one by George B. Cortelyou, president of the Consolidated Gas Company of New York, and first president of the American Gas Association.

The delegates divided into several groups and were escorted to various points of interest in New York as desired. All seemed to enjoy a sightseeing trip about the harbor.

As guests of the Greater New York gas companies, the visitors also enjoyed a visit to the Polo Grounds where they had the unusual chance of witnessing a World Series baseball game—a classic in American sports.

Various stations, works, and industrial installations were inspected while some of the visitors found time to visit American Gas Association Headquarters.

The Greater New York Committee on entertainment was as follows:

C. E. Paige, vice-president, The Brooklyn Union Gas Company, Brooklyn, N. Y., Chairman; O. H. Fogg, vice-president, Consolidated Gas Co. of New York; Alexander Forward, managing director, American Gas Association, New York, N. Y.; P. S. Young, vice-president, Public Service Electric & Gas Co., Newark, N. J.; A. J. Gonnoud, president and general manager, Kings County Lighting Co., Brooklyn, N. Y.; Mary E. Dillon, president, Brooklyn Borough Gas Company, Coney Island, N. Y.; Wm. J. Welsh, president, New York & Richmond Gas Company, Staten Island, N. Y.; Donald McDonald, secretary, American Meter Company, New York, N. Y., and H. Leigh Whitelaw, vice-president, American Gas Products Corporation, New York, N. Y.

On October 7 the French delegation sailed aboard the *Lafayette* from New York for France, and when at sea Mr. Baril sent the following radio message to Alexander Forward, managing director of the American Gas Association, New York:

Best thanks of French delegation for your amiability. Heartily,

A. BARIL.

British Go to Boston

The British delegates continued by rail to Boston, Mass., where they were guests of the New England Gas Association and the Boston Consolidated Gas Company. During the forenoon of October 7, the party boarded the tug *Luna* for a short trip about Boston harbor, and then went to the Everett plant of the Boston Consolidated Gas Company for a tour of inspection.

At noon, ladies of the party were entertained at luncheon in the Ritz-Carlton Hotel by wives of New England Gas Company executives, while the men were entertained at luncheon at the Parker House by a large group of prominent gas executives. In the afternoon those who desired saw the Harvard-Bates football game. Later, tea was served at Sudbury.

To take care of the welfare and entertainment of the visitors a general committee including officers of the New England Gas Association, and the Guild of Gas Managers of New

British delegation sees Boston Harbor from deck of tug

England was appointed by the president of the former organization as follows:

W. C. Beckjord, vice-president, Boston Consolidated Gas Company, Boston, Chairman; Clark Belden, New England Gas Association, Boston, Secretary; H. R. Sterrett, president, New England Gas Association, New Haven, Conn.; I. T .Haddock, president, Guild of Gas Managers of New England, Cambridge, Mass.; Walter M. Africa, Manchester Gas Company, Manchester, N. H.; Leland Balch, Assistant Treasurer, Lowell Gas Light Company, Lowell, Mass.; F. L. Ball, vice-president, Beverly Gas and Electric Co., Boston, Mass.; W. C. Bell, vice-president, New England Power Association, Boston, Mass.; P. R. Buchanan, superintendent, Hartford Gas Company, Hartford, Conn.; F. D. Cadwallader, vice-president in charge of sales, Boston Consolidated Gas Company; Thomas R. Carens, assistant to president, New England Power Association, Boston; Carl H. Cummings, president, Industrial Appliance Company of New England, Boston; David Daly, vice-president, Pawtucket Gas Company, Pawtucket, R. I.; R. L. Fletcher, engineer of operation, Providence Gas Company, Providence, R. I.; F. C. Freeman, president, Providence Gas Co., Providence, R. I.; Francis H. Golding, president and general manager, New England Gas and Electric Association, Cambridge; F. M. Goodwin, vice-president, Boston Consolidated Gas Co., Boston; H. B. Hall, commercial manager, Old Colony Gas Co., E. Braintree, Mass.; G. S. Hawley, president, Bridgeport Gas Light Co., Bridgeport, Conn.; R. H. Knowlton, vice-president, Connecticut Light & Power Co., Hartford, Conn.; W. H. Lawson, Central Vermont Public Service Corp., Rutland, Vt.; R. M. Leach, Taunton Gas Light Co., Taunton, Mass.; Alexander Macomber, Maine Gas Co., Portland, Maine; P. A. Nelles, Jr., industrial heating engineer, A. B. Tenney & Co., Boston; W. F. Norton, district manager, Public Service Co. of New Hampshire, Manchester, N. H.; A. E. Norton, manager, Nathaniel Tufts Meter Works, Boston; Charles R. Prichard, vice-president and general manager, Lynn Gas & Electric Co., Lynn, Mass.; J. J. Quinn, assistant to vice-president in charge of sales, Boston Consolidated Gas Co., Boston; G. W. Stiles, general manager, Portland Gas Light Company, Portland, Me.; H. Vittinghoff, consulting engineer, Stone and Webster Engineering Corp., New York, N. Y.; and John West, Arlington Gas Light Co., Arlington, Mass.

Ladies' Committee—Mrs. W. C. Beckjord, Chairman; Mrs. F. D. Cadwallader, Mrs. F. M. Goodwin, Mrs. I. T. Haddock, Mrs. Alexander Macomber, Mrs. C. R. Prichard, Mrs. H. R. Sterrett and Mrs. John West.

On Sunday, October 8, the British delegation sailed for England aboard the motor vessel *Georgic*. The following radio message from J. R. W. Alexander, secretary of The Institution of Gas Engineers, gives an idea of the appreciation of the overseas delegates for their entertainment while in the United States:

President and members of The Institution of Gas Engineers, aboard Georgic, *send cordial greeting to their colleagues of the American Gas Association and express their sincere appreciation of the kindness they have received during their visit to America. Kindly specifically transmit contents hereof to your members responsible for the success of our visit which will always remain in our memories as an event of outstanding happiness which has proved mutually advantageous and will contribute to the increased prosperity of our countries and the gas industry.*

A. E. Bradshaw Elected Oklahoma Natural Head

A. E. BRADSHAW, executive vice-president and a director of the First National Bank and Trust Co., Tulsa, Okla., has resigned to accept the presidency of the Oklahoma Natural Gas Corp. Mr. Bradshaw, who was named receiver for the company following the recent litigation, also becomes a director of the corporation and a member of the finance committee. Robert W. Hendee, former president, becomes vice-president and will relinquish his director's seat to Mr. Bradshaw.

Frank E. Kistler, chairman of the board, who has submitted his resignation, will become chairman of the finance committee, which position he held prior to becoming chairman of the board. As chairman of the finance committee, Mr. Kistler will remain on the board of directors.

Thomas N. McCarter Named Chairman of State Body

THOMAS N. McCARTER, of Newark, N. J., president of the Public Service Electric & Gas Co., has been elected chairman of a New Jersey State commission which will study the question of consolidation of municipalities. The commission was created by act of the New Jersey Legislature, in 1933, and it will report its findings in 1934.

Position of the Gas Industry In France*

By A. Baril

Vice-President, International Gas Union
Paris, France

I—*The Importance of the Gas Industry in France*

THE crisis through which the world is passing at the present time has not spared France any more than other countries; and in France, it has not spared the gas industry any more than other industries.

This may be clearly seen from the statistics compiled during the past few years.

From 1928 to 1929, the total quantity of gas sold[1] in France rose from 62,600,000 M cu.ft. to 65,800,000 M cu.ft., an increase of 5.2%. From 1929 to 1930 there was no change; from 1930 to 1931 there was only an increase of 1.3%, from 65,800,000 M cu.ft. to 66,700,000 M cu.ft., this slight increase being probably due to the strong propaganda campaign on the part of gas companies and municipal bodies resulting in a greater consumption for household purposes, thus compensating for—and more than covering—the decided decrease in sales to factories.

But the statistics for 1932 show a drop in the 1931 figures of 8,600,000 M cu.ft. The consumption per head of population is now about 1500 cu.ft. Compared to the corresponding figures of foreign countries who are more favored either by the nearness or abundance of raw materials, or the fact of a greater density of population, these percentages reveal an important margin and show the possibilities of developing the French gas industry as soon as the crisis has died down.

Production is insured by about 700 gas works of variable importance. As a single unit, the assembly of gas works supplying Paris has an annual production reaching 20,000,000 M cu.ft. Out of these 700 works:

	M Cu.Ft. a year
4 produce more than	1,750,000
16 produce more than	350,000 to 1,750,000
29 produce more than	175,000 to 350,000
140 produce more than	35,000 to 175,000

A. Baril

The quantities of coal distilled during 1932 were as follows:

French coal	2,623,923 tons
Saar coal	861,489 tons
Foreign coal	1,381,721 tons
	4,867,133 tons

The distilling of these tonnages provided:

Coke available for sale	2,106,807 tons
Tar	259,846 tons
Sulphate of ammonia	35,555 tons
Benzol	13,373 tons

During this same year, 1932, the *Societe du Gaz de Paris* distilled 1,461,301 tons of coal, and produced

763,980 tons of coke available for sale
88,914 tons of by-products
19,300,000 M cu.ft. of gas.

The *Societe d'Eclairage, Chauffage et Force Motrice* Gennevilliers Gas Works, supplying 132 cities in the Paris suburbs, carbonized 448,000 tons of coal, and produced 195,000 tons of coke available for sale, 8,000,000 M cu.ft. of gas, to which must be added 1,765,000 M cu.ft. of coke oven gas supplied to the *Societe* by its affiliated concern, the *Societe des Cokeries de la Seine*, thus giving a total production of 9,765,000 M cu.ft. of gas.

The above figures show the important place occupied in France—from the point of view of gas consumption—by Paris and its suburbs, which account for about 45% of the amount of gas produced through the country.

If we add that the total capital invested in the French gas industry amounts to about $300,000,000, the annual turnover at nearly $100,000,000—the number of persons engaged at 36,000 (28,000 workmen and 8,000 office staff), wages and salaries being $21,250,000 annually, we shall thus have revealed the important place occupied by the gas industry in French national economy, where it ranks immediately after the metallurgical industry.

II—*The Tendencies of the French Gas Industry*

Having described the importance of the French gas industry, we will now endeavor to set down the present tendencies in administrative, technical and commercial spheres.

1. *Administrative Sphere*

Of the 700 gas works existing in France, about 100 are municipal concerns and are run either by the towns themselves, as in the case of Colmar, Grenoble and Bordeaux, or by the intermediary of a contracting company, which is the case in Parts and Marseilles. The other 600 gas works belong to a comparatively limited number of private companies, and have been granted the monopoly for distributing gas in the districts administered by the town supplies. The concession contracts are not all alike, but

*Address before International Gas Conference and Fifteenth Annual Convention of the American Gas Association, Chicago, Ill., Sept. 26, 1933.

[1] Unit: M.C.F. (Thousand Cubic Feet). Conversion factor used; 1 cubic meter equals 35.3 cubic feet.

they are all more or less drawn up along the lines of a standard specification which, being laid down as a model in 1921 by the Ministry of Interior, constitutes in a way the "Charter" of the French gas industry.

This specification fixes, in particular, the nature and quality of the gas, which must not contain more than 15% (by volume) of carbon monoxide, nor have a maximum calorific power of more than 505 B.t.u.

The formulae for arriving at the selling price of gas are suggested for the choice of the contracting parties. In one of them, known as Formula A, the selling price of gas is settled during the first six months of each year in accordance with its working cost price for the preceding year, this cost price being worked out by the formula:

$$P = C + S + F - H$$

where C represents (brought to the cubic foot of gas sold), the expenses pertaining to the coal distilled and the maintenance of raw materials required for manufacture, distribution and sale of the gas, S the expenditure pertaining to salaries, F the expenses pertaining to running expenses, and H the receipts derived from the sale of by-products.

This cost price P, plus financial charges and a certain figure N fixed in the contract, gives the selling price. This is the formula used more especially for the working of the *Societe d'Eclairage, Chauffage et Force Motrice*, in the Paris suburban area.

The other formula, known as Formula B, more currently used, is a contract co-efficient formula, made up as follows:

$P = p + K\ (C-c) - K'\ (H-h) + K''\ (S-s)$ in which

P = Selling price of gas sought, in centimes

p = basis price of gas, in centimes, established by taking into account the economic situation at the time of placing the contract, characterized by the values of c, h and s.

C = price of coal in francs, per ton, delivered to works.

c = reference price of coal, in francs, per ton, delivered to works.

H = average net price of by-products, in francs, per ton, at works.

h = average net reference price of by-products, in francs, per ton, at works.

S = average salary per hour, in francs.

s = average reference salary, per hour, in francs.

K = the influence on the selling price of a cubic metre of gas, of a variation of one franc per ton of coal distilled.

K′ = the influence on the selling price of a cubic metre of gas, of a variation of one franc in the selling price of a ton of the combined by-products.

K″ = the influence on the selling price of a cubic metre of gas, of a variation of one franc in the average salary per hour.

We do not propose to get into the clauses of the standard specification which also provide for the communities sharing in the profits of the enterprise, the penalties to be imposed in the event of gas shortage, etc.

The establishing and putting into operation of the foregoing have been undoubtedly one of the most important events in the life of the French gas industry during the fifteen years following the War, since when all contracts have had to be adapted to meet the new economic situation.

2. *Technical Sphere and Commercial Sphere*

In the technical sphere, we would first point out the progressive disappearance of small gas works and the concentration of production in medium or even large powered works which act as gas power stations.

Instances of this are both numerous and striking. In Paris, the old intramural gas works have disappeared (Passy and Vaugirard) or are in course of demolition (Ivry and St-Mande). The city's supply will be ensured by the four large works at LaVillette, Clichy, Landy and Cornillon. From these works the gas compressed at about 52 inches water pressure is directed into a high pressure system which supplies (through the intermediary of a certain number of pressure-reducers placed at strategic points and easy to inspect), the low pressure system. By means of this system, the *Societe du Gaz de Paris* has been able to equalize the pressure throughout the area covered by its undertaking and this in spite of the variable height of various parts of Paris, and their distance from the source of production.

Centralization has been carried still further in the Paris suburban area where the *Societe d'Eclairage, Chauffage et Force Motrice*, in connection with the vast extension scheme, constructed a gas power station in 1904-1905, which, in 1906, supplying 60 communities representing a population of 850,000 inhabitants then consuming 1,650,000 M cu.ft. of gas, now supplies 132 cities spread over three countries, comprising 2,250,000 inhabitants, to whom nearly 8,550,000 M cu.ft. were sold in 1932.

This concentration of production, combined with a system of distribution comprising a network of 2,470 miles, with 160 miles of high pressure mains and which has long ago solved the problem of long distance transport of gas (the most distant cities are 27 miles from the works) has permitted the extinction of 8 works of minor importance (Issy, Charlebourg, Argenteuil, Suresnes, Montreuil, LeBourget, Antony and Longjumeau) and the realization, under reasonable price conditions, of the conveying of gas to rural districts where it would not be possible to build gas works.

In this way, the *Societe Lyonnaise des Eaux et de l'Eclairage* has just linked up its Nanterre works to Chantilly and Mantes by two feeders, one of steel, the other in cast iron, having a total length of about 75 miles, which has already settled the question of suppressing the works at LePecq, Mantes, Meru, Auvers-sur-Oise, etc.

This movement is gaining ground in the provinces; the new Blancpignon works, near Bayonne, now supplies the whole of the Basque coast from Bayonne to Hendaye, replacing the old works at Bayonne, Biarritz and St. Jean-de-Luz; in a similar manner, in Alsace, a gas main now connects Strasburg to Selestadt; in the south of France, the Nimes main, of welded steel, with a length of about 26 miles, supplies the old works at Beaucaire and Arles.

These are a few out of a large number of examples, and there is no need to quote others, as the foregoing give a very clear idea of the present tendency of French gas companies toward the creation of regional centres of production, distributing the gas that they produce over large areas.

Another sign of the times is the

distribution of coke oven gas in mining regions and more especially in the north of France. In this way, the *Societe Regionale de Distribution du Gaz* has established in the region of Lille and Douai an important system that operates under satisfactory industrial conditions. The Douai system which, at the beginning of 1924, transported 1,760,000 cubic feet of gas per day, now has an output of 7,000,000 cubic feet and receives gas from 5 coking plants. It is about 22 miles in length and the diameter of its mains varies between 5 and 16 inches. It supplies important works in passing (foundries, steel works, chemical works) and important urban distributions (Douai, Somain, Aniche, Denain, etc.). The Lille system, 38 miles long, receives gas from the Lens, Courrieres, Dourges, and Drocourt coking plants. It feeds the urban distributions of Lille, Roubaix, Croix, Carvin, etc., and serves a total population of over 700,000 inhabitants. The gas works throughout this region have been closed down, but they are kept in working order so as to make up any possible deficiencies in the production of the coking plants.

The success of this scheme had been of such a nature in the north that toward 1926 the idea of transporting gas from the northern mines to Paris, which had already been suggested in 1901, was again brought up in the press and became the object of a searching enquiry on the part of the gas companies in the Paris area.

The volume of gas to be transported would have to attain the figure of 35 million cubic feet per day, i.e., the total quantity of gas available at the mines. The distance between Paris and the junction point of the different systems emanating from the northern coking plants was 146 miles by the shortest route.

The enquiry confirmed the fact that the undertaking, whilst attractive at first sight, could not be considered from an economic point of view; the main reason for this conclusion lies in the fact that the transportation by piping of the quantity of gas capable of being extracted from a ton of coal costs much more than the carriage of the same quantity of coal; and this comparison in favor of the transport of coal is still further emphasized when it is borne in mind that by carrying the coal from the mine to the Paris area, there is also taken (apart from the gas), the coke, the benzol, tar, and ammonia that it contains.

Practice has confirmed this enquiry and it is now more or less generally accepted in France that the maximum distance for transporting gas under commercial conditions is about 25 to 30 miles.

After having indicated the two dominant tendencies of our industry during these past years, with regard to the general problem of production, we will now glance rapidly over the question of manufacture, distribution and utilization.

A. *Manufacture*

Most of the small gas works have remained faithful to horizontal retort ovens, doubtless because of their flexibility and ease of running, these qualities enabling coal obtained from very varied sources to be carbonized in the said retorts, which is of a very special importance at a time when, owing to enforced economy we are deprived—at least in part, of good quality gas coal from abroad.

Many works of medium importance still possess horizontal retort ovens; but those now being constructed are nearly all equipped with continuous or discontinuous vertical chamber ovens; for example, we would mention, amongst recently constructed or modernized works, those at Tours, Boulogne-sur-Mer, Bordeaux, Nantes, which have or will have discontinuous vertical chamber ovens, the Nanterre works with Glover-West ovens, the Bayonne plant (Blancpignon works) with Woodall-Duckham ovens.

The large works are all equipped differently. At the *Societe du Gaz de Paris*, the most recent are the Clichy and Cornillon works; the former has French type Woodall-Duckham ovens, the latter inclined chamber ovens, whilst the Landy works have only horizontal retort ovens.

The Gennevilliers works have horizontal retort ovens, sloping chamber furnaces and Woodall-Duckham ovens, the capacity of the latter (10 tons per 24 hours) being the maximum capacity of ovens of this type installed in Europe.

From the point of view of the equipment of French gas work, we would mention the rarity of gas works employing coke furnaces. With the exception of the northern coking plants for which gas is always a by-product, there are, in fact, only 3 real gas coking plants in France: those at Gennevilliers, Strasburg and Toulouse. We think that this fact is worthy of note, for it forms contrast to the present-day tendencies of certain countries, Germany, in particular.

With regard to the heating of the ovens, it is quite clear that there is a very decided movement in favor of central producer stations. Some large works—Clichy, Lyons, for example—have adopted revolving grate producers of the Kerpely-Marischka type grouped in batteries at some distance from the distilling plant and heating their ovens with cold gas. Many other smaller works—Blancpignon, Dijon, etc. and even important ones like Gennevilliers, have not given up Siemens producers, but the latter are no longer directly connected up to the furnaces; the heating gas from all the producers is conducted to a single fireproof collector which acts as distributor. In this case, the producers are close to the furnaces thus affording the advantage of utilizing a hot gas for heating and the ability to isolate a producer without in any way interfering with the service.

We would point out that in accordance with a special law (under date July 22, 1923) and for reasons of national defence, the large works are obliged to recover the benzol contained in coal gas. More than sixty works are at present subject to this obligation. Certain works carry out oil washing, whilst others, fewer in number, employ active coal.

We would add that most of the important works possess plant for manufacturing water gas, whose utilization is bound up with the situation of the coke market. Amongst the most powerful installations, the improved Humphreys and Glasgow type belonging to the *Societe d'Eclairage et Force Motrice* at Gennevilliers, was the first in the world to be operated in an entirely automatic manner, the automatic operation of the mechanical parts including the charging of the coke and the extraction of ashes and clinkers.

Integral gasification is not very widespread in France where there are only a few appliances in operation.

Gas from coke furnaces makes up the difference required by gas works, as we have already mentioned.

Lastly, in concert with paraffin refiners, gas companies are now studying ways of utilizing the incondensable paraffin gases that the cracking plants of refineries in course of construction in France will shortly have available in somewhat large quantities. Thanks to the extreme kindness of the American Gas Association—to which, in the name of my French colleagues, I would pay fresh homage—we have been enabled to gather together most important data with regard to what has been realized in the United States on this subject and our enquiries have thus been considerably facilitated. Nevertheless, they are not sufficiently advanced to allow us to put down here what the future may bring forth in this connection.

B. *Distribution*

Cast iron and steel mains are used concurrently without there being any noticable predominance of either system. A recent paper (J. Coudeville, Tests in connection with the leakage of gas in long distance conduits, 1933 Congress of the French Gas Industry) showed that from the practical point of view there was very little difference, for normal outputs, between load losses caused by cast iron or steel piping.

The joints practically universally employed for connecting cast iron conduits are those known as "Precis" joints in which the rubber washer used presents a surface coming into contact with the gas, reduced to a strict minimum. To avoid any contact between the rubber and gas, and attacks that might result, some concerns protect the surface of the rubber with a strip of lead.

For steel piping, only lap welding is employed.

Whether it is a case of cast iron or steel mains, the transportation of high pressure gas tends to become general, but up till now, very high pressures have not been used.

In all systems, gas is distributed at low pressure by means of district reducers of which certain types offer first class working and safety guarantees; the employment of subscribers' reducers is the exception, in France.

With regard to interior fittings, we would just mention that they are of iron or lead, according to the district.

Coming to the question of meters, we would point out that improvements are continually being made in their manufacture, whether they are water, oil, or dry meters. The oil meter is specially popular with users. The technique of meter manufacture has enabled strong and sensitive appliances to be turned out that have very slight load losses. Enquiries are now being conducted with a view to limiting the types of meters used for domestic purposes to a small number.

C. *Utilization*

I feel somewhat diffident in mentioning here the great progress made in the sphere of gas utilization in France, by the stamping department created in 1929 by our Gas Industry Technical Association. The fact is that I presided over the destinies of this corporate group when this important question was under consideration, and I was led to take a very active part in the enquiry. However, the possession of complete data on the subject does not permit me to pass this over without comment.

The stamping of utilization appliances meets two preoccupations:

1°—It affords the public the means of acquiring utilization appliances (kitchen fittings, water heaters, central heating boilers, radiators, stoves, etc.) offering sufficient qualities as regards working, solidness, life, output, safety, commodiousness, appearance, . . .

2°—It contributes in a permanent manner toward the improvement of construction and the perfecting of appliances.

In order to secure the A.T.G., stamp appliances submitted for examination by two laboratories must comply with a certain number of severe conditions—especially with regard to output and hygiene—codified in a list of regulations drawn up by a Commission consisting of technicians and specialists possessing unimpeachable qualifications and working under the supervision of the Committee of the Technical Association.

This stamp has had a very favorable reception on the part of gas companies and constructors, and, during the three years that it has been in operation, the results have been quite up to our expectations. Up till June 1st, last, 252 appliances had been submitted for stamping; of these 148 were stamped, 34 were still being tested, and 70 were rejected for stamping; moreover, considerable progress was registered both in the technique of the appliances as well as in the improvement in their appearance.

With regard to the reception accorded by the public, the number of appliances bearing the A.T.G. stamp, 330,000, or about a tenth of the gas subscribers in France, is the most effective testimonial. It shows that the efforts of the *Association Technique de l'Industrie du Gas en France* and our central propaganda organization, the *Societe pour le Developpement de l'Industrie du Gaz en France*, have not been in vain. And it is certainly due to these combined efforts, as well as the propaganda campaigns instituted by the gas companies, whose commercial departments have been developed and adapted for the objects in view, for the hire-purchase of utilization appliances, especially water heaters, gas cookers, and radiators, that we have not to deplore in France a greater falling off in gas sales. Special classes have been formed by our syndical organizations for teaching commercial agents; in addition, the companies themselves have made a determined effort, both in the organization of their sales departments, as well as by propaganda work. There is not a single town that does not possess at the present time, an up-to-date and carefully stocked showroom for the sale of gas utilization appliances. And lastly, in order to leave no stone unturned, the companies take part in all fairs and local exhibitions.

The results for the past three years have been particularly encouraging. The development of household consumption has made up, to large extent, for the deficit produced by the decrease in gas sales for public lighting and industrial purposes. There is one point that we should like to emphasize: The progress made by the large gas cooker, especially in the Paris area, this being the more re-

markable not only because gas suffered by the economic crisis, but also that it has to encounter formidable competition.

We do not reckon butane (which has just made its appearance on the French combustible market) as a competitor, but look on it more in the light of an auxiliary that can be very useful in districts either too far removed or not sufficiently important to warrant the laying down of gas mains.

To round off this general survey of the present situation of the French gas industry, we shall deal briefly with the question of by-products.

In 1932, as we have already mentioned above, the French gas industry produced:

2,106,807 tons of coke available for sale
259,846 tons of tar.
25,555 tons of sulphate of ammonia
13,373 tons of benzol.

In France, gas coke has a serious competitor in metallurgical coke and mazout (oil residues) and gas companies will have to strain every nerve in order to develop—and even to keep—their clientele.

Up till a few years ago, tar was a by-product that was such a nuisance to gas works that many of them thought of burning it for heating the furnaces; the War—during which there was a large consumption of tar derivatives—revealed the considerable number of more or less complex organic bodies, more or less valuable, that could be extracted from tar by distillation.

Since that time, important gas works have not hesitated to extend their field of manufactures into the sphere of chemical products, and have put on the market such products as pure naphthaline, raw phenols and even pure phenic acid and mixtures of refined cresols. Post-war conditions have also brought about the general use of tar for road surfaces (555,500 tons in 1932 compared with 3,300 tons in 1913). Road departments formerly used crude tar, which gives good results when first applied but seriously affects future coatings owing to its fluidity. Road departments now demand prepared tars containing a very small quantity of water and light oil, which has led many gas works to put in tar refining plants.

On the other hand, the fact of competition from synthetic fertilizers has caused a serious falling off in the manufacture of sulphate of ammonia. Moreover, there is a possibility that the gas industry will give up the manufacture of sulphate and turn towards nitrate of ammonia.

We have already mentioned the extraction of benzol from coal gas; we would only mention in passing that this operation now presents a limited interest from the economic point of view.

This concludes the rapid survey that we have endeavored to make of the sphere belonging to the French gas industry. We have sought to bring out the general tendencies, essential characteristics, recent doings and the results. We think that we have shown you that in spite of the world crisis which has not affected it so seriously as other branches when its special nature is taken into account, this industry is in a healthy state and well prepared to deal with tomorrow's tasks. There are signs that lead us to believe that economic conditions are about to improve and that a new era of prosperity will shortly open up. In this connection, French gas companies are optimistic and full of rational confidence, based on the solidness of their undertakings which have always been wisely governed, and in which thousands-upon-thousands of small shareholders have an interest; always on the watch for scientific progress, improvement in technique, development of markets and social betterment, they are ready to take part, in their sphere, in the awaited improvement of the world's economic conditions. They have no doubt that, if circumstances alter for the better and allow the gas industry to liberate the potential energy with which it is impregnated, it will once more ascend the commercial scale and register new progress.

A.G.A. Laboratory Tests Expose Deficiencies Of So-Called Gas Savers

FOR years, various devices popularly known as "gas savers" have been offered for sale to domestic and commercial consumers of gas. These devices are usually designed for installation in gas supply lines or on gas appliances, and are supposed to effect a saving in the consumer's monthly gas bill, as well as satisfy many other sweeping claims often made by their manufacturers or distributors relative to the benefits they are alleged to bestow. Serious doubt, not only concerning the value of such contrivances, but also as to whether they should be permitted to be installed, has often been raised.

As early as 1928 the American Gas Association Testing Laboratory made extensive tests on all such devices then available and issued a comprehensive bulletin covering its findings. Since that time numerous other contrivances of this character have been developed and put on the market. These comprise mechanisms all the way from cheap hand-made attachments to devices selling at prices as high as $12 to $15 or more, each. These include contrivances for installation in gas lines, around and over burners, or in the flue pipe from gas appliances, as well as attachable solid tops.

The numerous demands by gas users, utility companies and others for complete and authentic information concerning the effects of such devices on gas appliance performance necessitated the Testing Laboratory making a further investigation of all such devices being marketed at the present time.

During the past two years some 42 representative types of so-called "gas savers" were secured by the Testing Laboratory and thoroughly investigated. In fact, at least one model of every available type of such contrivance was tested. Each of these devices was found to violate at least one principle of good combustion equipment design. In practically all cases the use of a "gas saver" was found to result in the creation of hazardous conditions of gas appliance performance. In no instance was the employment of a so-called gas saving device found to be beneficial. The contrivances were found to increase the amount of gas necessary to do a given cooking or heating job rather than reduce it, since they caused a decrease in the efficiency of the gas appliance with which they were used.

A comprehensive bulletin covering the results of its findings and showing pictures and drawings of the various devices studied has been prepared by the A.G.A. Testing Laboratory and probably will be generally available at a later date. It is believed that the information contained in this bulletin will be of vital interest and value to gas appliance dealers, department stores, gas companies, and above all, to the gas consuming public which, unquestionably, is made the principal victim of uninformed or unscrupulous salesmen of equipment which is often without merit and which may represent an actual hazard if used.

Gas Makes Possible "Home of Controlled Climate"

FEW developments in scientific living have won more widespread and instant public acclaim than air-conditioning. Thousands have experienced the pleasing effects of cooling and de-humidifying the atmosphere as accomplished in many large department stores, theatres and in some of the country's crack trains.

"Home of controlled climate," in Germantown, Pa.

But, in so far as the private home is concerned, summer air-conditioning is virtually an unknown factor. It is for the purpose, therefore, of demonstrating the practical advantages of air-conditioning for the average home and of exploding the theory that air-conditioning inevitably produces a chilly, "clammy" feeling, that The Philadelphia Gas Works Company, Philadelphia, Pa., recently announced a public exhibition of the city's first residence to be completely cooled in summer and heated in winter by gas.

"The Home of Controlled Climate," as this ultra-modern and charmingly individual house is known, is located in a distinctive residential section of Germantown, Pa. Of early American Colonial design, which harmonizes with the architectural motif of the neighborhood, it is built of native stone, eighteen inches thick, with steel supports. Its ten generously proportioned rooms and attractive 2-car garage are adequate for a family of almost any size.

The first floor contains a living room, 16′ by 22′ in size, with three exposures, a bright cozy dining room featuring colonial style fixtures and wall paper, a charming secluded library with knotted pine panelling and spacious book shelves, a center hall, kitchen and butler's pantry. The five large bedrooms and three baths on the second floor are furnished in diversified style and color with superb taste. In the basement there is a large recreation room, laundry and compartment for the air-conditioning equipment.

The influence of Colonial traditions is seen in such small but colorful details as black rim locks on all doors and random width oak flooring. Furniture, rugs and hangings are conservatively modern in style.

Among the many novel features of the house from the construction angle are the use of solid sheets of cork insulation 1½" thick in all outside walls and second floor ceiling and rock wool around window and door frames and eaves. Such provisions assure a substantial saving in fuel cost in winter and extra comfort and coolness in summer. It is also the first home in the country to be equipped with single window sash having two panes of glass separated by an air space. This arrangement reduces heat loss in winter and heat penetration in summer and prevents "fogging" of windows on cold days.

Persons entering the home are immediately impressed with the refreshing, invigorating atmosphere—even on the hottest days. After remaining in the house for a short time one becomes utterly unconscious of the temperature, so effectively is the proper balance between humidity and temperature maintained. Not a window is open—nor a door—to admit dust, dirt or noise.

All this is accomplished by a simple, compact gas-operated unit occupying a small compartment in the basement, which automatically filters, de-humidifies, cools and distributes the air throughout the house through a system of inconspicuous ducts. This machine was developed under the sponsorship of the Committee on Industrial Gas Research of the American Gas Association. In summer, the outside air is drawn into a slowly revolving chamber and passed through a bed of de-humidifying material known as Silica Gel—which absorbs atmospheric moisture like a sponge. Ordinary tap water is used to regulate the humidity of the air and cool it to

All-gas basement in "home of controlled climate"

Recreation room in basement of "home of controlled climate"

All-gas kitchen in "home of controlled climate"

a comfortable degree, following which the air passes through a fine mesh filter which removes all dust particles. Finally, the "conditioned" air reaches a fan chamber from which it is forced into the circulating ducts. Gas heat is applied to drive off the moisture collected in the Silica Gel bed and to restore its full absorbent powers every 20 minutes.

The only difference between the winter and summer air-conditioning processes is that in cold weather the air is first heated and humidified and in summer, it is dehumidified and cooled. The entire heating and cooling system is controlled thermostatically and operation of all equipment may be controlled from a small bronze panel located in the stairway leading to the basement. From this central control, one may dictate, whether, according to outside conditions, the air shall simply be circulated; whether it shall be cooled and circulated; or whether the combination of cooling, drying and circulating is necessary to produce comfort.

Of special interest to visitors—once they have investigated the air-conditioning equipment—are the kitchen and the recreation room in the basement. The kitchen is designed as a complete and compact unit with all equipment so grouped that work may progress from one stage to the next without loss of time or effort. Beautiful vitreous tile of an oatmeal shade line the walls from floor to ceiling and the floor is covered with a harmonious pattern of rubber tile. Monel metal gives a sparkle and sanitary surface to the unusually large sink, double drainboard and range top. The balanced grouping of built-in cupboards on each side of the sink and work center provides generous storage space for food and utensils within easy reach.

In the beautiful table-top gas range with its automatic time and heat control, and the silent, air-cooled gas refrigerator, this kitchen has the most efficient and economical appliances available.

The recreation room in the basement is perhaps the most inviting room in the house. With all the cumbersome equipment of old-fashioned heating banished, and the air-conditioning units confined to a small cubicle adjoining this room, virtually the entire basement is usable for recreation purposes.

The recreation room proper with its great brick fireplace, panelled walls and hardwood floor affords a cozy retreat for study and play.

In addition to its use in the air-conditioning equipment and for cooking and refrigeration in the kitchen, gas provides many other comforts in this really modern home. A gas-operated water cooler supplies running ice water in the master-bathroom, recreation room and butler's pantry. An automatic gas storage water heater assures an instant supply of hot water day and night. Likewise, for drying and ironing the clothes, disposing of garbage and trash, and heating the garage, the dependable and economical service of gas is called into play.

C. J. Merritt Is Awarded A. G. A. Scholarship

C. J. MERRITT, of Danville, Ind., who was graduated in 1930 from the School of Chemical Engineering, Purdue University, has been awarded the American Gas Association Scholarship for the coming year, according to an announcement made by Prof. R. B. Leckie, head of the gas engineering division of the School of Chemical Engineering.

Under the terms of his scholarship, Mr. Merritt will spend the present academic year in a research program designed to develop new methods of metering large volumes of gas. He was chosen for the scholarship because of his outstanding work in the field of gas research. A committee composed of Dean A. A. Potter, Professor H. C. Peffer and Professor Leckie made the award.

During his senior year at Purdue, Mr. Merritt worked on a research project on the use of gas in house heating, with the Indiana Gas Association providing the funds for his work. Following graduation he went to the American Gas Association Laboratory, Cleveland, Ohio, where he spent three years in research, a year of which was at the United States Bureau of Standards, Washington, D. C. He will continue his studies at Purdue in the Graduate School while working under terms of the scholarship this year.

Heat Treating Rifle Parts With Gas Furnaces*

By J. B. Nealey

American Gas Association

THE hammerless lever action, high power rifle was invented by Arthur Savage some thirty odd years ago, and the company he formed for its manufacture, the Savage Arms Corp., has grown until today, with its subsidiaries, it is said to be the world's largest maker of sporting arms. In 1920 it purchased the J. Stevens Arms Co., Chicopee Falls, Mass., and in 1929 the A. H. Fox Co., Philadelphia. The organization, plant and equipment of the Stevens Arms Co. were kept intact and are producing shotguns and small rifles in large quantities. The equipment of the Fox Co., however, was moved to the main plant of the Savage Arms Corp., in Utica, N. Y., and high grade shotguns of the Fox design are now being produced at this plant.

During the war the Utica plant of the Savage Arms Corp. manufactured 250 Lewis machine guns daily and employed 8,000 men. Since then, much of the equipment has been adapted to the making of washing machines, health motors, household ironing machines, commercial refrigerators and kindred devices.

There are three ways of making a rifle barrel,—rolling, as at the Springfield Arsenal; forging, as done by the Winchester Repeating Arms Co., and machining from bar stock, as at the Savage Arms Corp. plant. The raw material used here is in the form of steel bars 1-1/16 inch in diameter and of the same analysis as is employed in the barrels of the government Springfield rifle. The analysis is:

Carbon	0.45-0.55
Manganese	1.00-1.50
Phos. Max.	0.09
Sulphur max.	0.06

More than twenty-seven different types and calibre of rifle barrels, each requiring from thirty to sixty-five machine operations, are produced.

Corner in Assembly Room

The bars are chucked in special drilling machines, hollow drills for oil circulation being used, and the bars are rotated against the drills which are held stationary. With this method the drill tends to center itself and a straight hole through the center is obtained. Reaming is accomplished on a special machine which reams the bores of eight barrels at the same time.

The hollow bar is next machined in a lathe to the correct exterior shape and dimensions, octagon shaped barrels being produced in multiple milling machines. For rifling a special machine holding five barrels stationary, is used. The cutters are fed through the barrels, set for cutting and drawn back, making six cuts for six grooves. A slow screw motion is given the cutter so that the grooves make the proper number of turns in the barrel. The grooves average .004 in depth.

The cutter or rifling head consists of tubular steel in which the cutting tool is set. As this head emerges from the barrel, after making a cut, a mechanism engages it and raises the cutter another notch for the next and deeper cut. The cutter is drawn through a number of times to produce the proper depth and width of groove, and this requires about forty minutes. Chambering is accomplished on turret lathes, each equipped with seven special reamers, all of which are forced into the breach end of each barrel in progression. The end is then turned down and

* Reprinted courtesy *American Machinist*.

threaded for the receiver. Grinders and buffers are used for finishing.

Shotgun barrels are produced in the same way except the rifling operations are omitted. The bores of all shotgun barrels are machine lapped by forcing metal rods, wound with metal cloth, through them and at the same time rotating the rods at speeds ranging from 1200 to 1500 r.p.m. This operation heats the barrels so fast that they have to be lapped under water. Rifle barrels are machine-lapped in a special machine with a reciprocating motion using laps made of lead. The final glossy black finish is procured by applying a rust producing acid, steaming for twenty-four hours and buffing, this process being repeated for three days in succession.

The stock for the receivers comes as drop forgings and these are first chucked in vertical drilling machines where eight operations are performed on each forging progressively. These are:

1. Rough bore magazine hole.
2. Finish bore magazine hole.
3. Rough bore (to large dia.) bottom of magazine hole.
4. Finish bore and ream same.
5. Bore barrel hole.
6. Counter bore barrel hole (rough).
7. Counter bore barrel hole (finish).
8. Hobbing end for barrel.

In all it requires 108 operations to produce the receiver for the 99 model rifle, while 780 operations are used in manufacturing this model complete.

There are many lines, groups and batteries of special machines for making the smaller parts such as bolts, striking pins, sears, triggers, trigger levers, etc. etc. Stocks and forearms are thoroughly dried in modern dry kilns, then sawed out and finished in the woodworking division which is completely equipped with the latest and most up-to-date woodworking machinery. Large numbers of special tools are required in the manufacture of these guns and complete tool and die shops are maintained in which most of these tools are produced.

The life and endurance of a gun depends upon the physical characteristics of the component parts and these in turn are determined by the various heat treatments to which the parts are subjected. The heat treating division of this plant is housed in a room 50 x 150 ft. which is equipped with gas fired furnaces throughout. These are arranged along the walls and in groups about the floor with quenches conveniently placed.

Annealing and pack hardenings are accomplished in four double-chambered, brick furnaces, steel encased, each 10 ft. wide, 8 ft. deep and 6 ft. high and provided with counter weighted doors in front. These are underfired with five gas burners on each hand. Alongside of the one used for pack hardening is a hooded quench tank. Bolts, lifters, hammers and triggers are packed in welded steel boxes, 9 x 10 in., with two trunnions and a long pipe, with a head that fits over the trunnions, is used to charge the boxes into and out of the furnaces. On withdrawal the contents of the boxes are dumped directly into the quench (otherwise lose color), the door of the hood being closed to prevent the flash of the compound from bursting into the room. The parts are caught in a submerged, screen-bottomed tray while the compound is settled out of the water and re-used.

A row of four furnaces built of brick and encased in steel is used for miscellaneous heat treatments. These are each 4 ft. square and are heated with two gas burners on each side, four in all, firing under the hearth. Carburizing is done in two types of furnaces, oven and rotary. The first includes two of brick and steel, each 4 ft. long, 3 ft. wide, and 4 ft. high, and are fired with six gas burners, three on each side, underfiring the hearth. All of these furnaces are on legs.

There are several of the rotary tilting type which consists of a steel shell, refractory lined, with an alloy steel retort within that is rotated by motor. These are 4 ft. long and 2

Gas fired nitre pots used in annealing, drawing and bluing

Gas fired batch type furnaces used for miscellaneous heat treatments

ft. in diameter and are heated with ten gas burners, five on each side. Instead of using a carburizing compound, city gas is circulated through the retorts. (This gas is first enriched by bubbling it through gasoline.) Another of these furnaces, with one long pipe burner in the bottom, is used for bluing, bone dust being employed.

A temperature recorder, with a multi-point switch, is part of the equipment here and this recorder charts the temperature of six furnaces at a time, all in different colors. Visual pyrometers are also used.

Cyanide pots are used for most of the hardening, and there are five of these, each with its brick furnace some 3½ ft. in diameter which is heated with two gas burners. One oven type furnace, 4 ft. square and fired with four gas burners, is also used for hardening. For high speed tools there are five small oven-type furnaces. Spot hardening on the bolt lock in the receiver is done with a gas welding torch, the part being brought up to a cherry red (about 1450 deg. F. and then quenched in oil. This part is drawn back to 450 deg. F. in oil).

A battery of four nitre pots with brick furnaces (2-in-1 furnace) is used for annealing, drawing and bluing. The furnaces are 5 ft. long, 4 ft. wide and 3 ft. high and are heated with four gas burners each. There are also four oil tanks, each heated with a gas burner, in which different parts are drawn. The oil quench tanks are supplied from a 10,000-gallon tank located outside of the building. The oil is pumped from this to the smaller tanks and the over-flow returns by gravity to the larger tank. This recirculation keeps the quenching medium cool. Gas is supplied to the furnaces, already mixed with air for combustion, a central mixing unit being employed.

While the many types and calibre of guns made here require a very large number of small parts, only about fourteen different analyses of steel are employed and eight of these come under the heading of carbon steels. That used in the rifle barrel is classified under this latter heading, the closest S.A.E. number for it being 1350.

The parts made from seven of these carbon steels have the same heat treatment consisting of quenching at 1450 deg. F. in oil and drawing back to 900 deg. F. These steels are as follows:

S.A.E. 1035 S.A.E. 1055 S.A.E. 1075 S.A.E. 1112
S.A.E. 1020 S.A.E. 1065 S.A.E. 1095

The heat treatment specified above is subject to some slight modifications depending upon the service required of the part.

Some of the parts are spot hardened with a gas torch and drawn to 450 deg. F. to 550 deg. F. While most of these are heat treated in the oven type furnaces, a few are heated in the cyanide pots. Also some of these parts are quenched in a solution of saltpeter and water, for color as well as hardness.

One of the screws is made from S.A.E. 2320 steel, hardened in cyanide, quenched in water and nitre blued. On some models, many parts are S.A.E. 2345 steel, but receive practically the same heat treatment as the carbon steels. Other parts are of S.A.E. 6150 steel and are heated at 1550 deg. F. oil quenched and drawn at 900 deg. F.

The making of a firearm is only part of the manufacturer's activities as he must not only keep abreast of developments in similar establishments throughout the world, but he must be a little bit ahead. Hence the research department of this concern is one of its features and not a few pioneer developments have been perfected there. Included in these are the famous rifle cartridges, the .22 Savage Hi-Power and 250/3000 Savage.

After heat treating all parts are sent to the stock room and are requisitioned from there for assembly. Specially trained workmen are employed in the assembly department, for here more than thirty-two major parts are carefully assembled into the smoothly operating, finished rifle. After assembly all rifles are thoroughly tested and inspected before final approval by the inspection department.

Dr. H. J. Rose Heads Gas and Fuel Division

DR. H. J. ROSE, a senior fellow of Mellon Institute of Industrial Research, Pittsburgh, Pa., has been elected chairman of the Gas and Fuel Division of the American Chemical Society for the year 1933-34.

Dr. Rose, who has been a member of the Mellon Institute research staff since 1918, has made many important contributions to the literature of by-product coke technology and coal classification. He now heads a multiple industrial fellowship that is engaged in research on anthracite.

Proposed A.G.A. Listing Requirements For Gas, Pressure, and Temperature Control Accessories

By Harry W. Smith, Jr.

A. G. A. Testing Laboratory

EARLY in 1932, the first steps were taken toward extending the American Gas Association's testing and certification program to include the recognition of gas appliance accessories as such in addition to the customary approval of complete gas burning appliances. At that time, however, it was realized that complete "approval" could not be granted to separate accessories inasmuch as their satisfactory performance depended so vitally upon both the type of appliance to which they were attached and the manner in which they were installed. Therefore, it was decided to develop "listing" standards which, when met by an accessory, would attest to the safety, good design, and proper performance of such an accessory when properly installed.

Accordingly, appropriate subcommittees were appointed by the A.S.A. Sectional Committee, Project Z21, A. G. A. Approval Requirements Committee, to draft suitable "listing" codes governing the construction and performance of all common types of gas appliance accessories. Each of the subcommittees appointed is made up of experts on the type of gas appliance accessory with which that particular body is concerned, manufacturers of each different type of accessory as well as gas company engineers being on the committees.

Five such subcommittees on listing requirements were formed:

1. Subcommittee on A. G. A. Listing Requirements for Conversion Burners,
2. Subcommittee on A. G. A. Listing Requirements for Draft Hoods,
3. Subcommittee on A. G. A. Listing Requirements for Gas Cocks,
4. Subcommittee on A. G. A. Listing Requirements for Semi-Rigid Gas Tubing and Fittings, and
5. Subcommittee on A. G. A. Listing Requirements for Gas, Pressure, and Temperature, Control Accessories.

In spite of present economic conditions the work of these committees has been actively carried forward during the past two years. The preparation of these requirements necessitated extensive research which was carried out by the A. G. A. Testing Laboratory, Cleveland, Ohio.

Progress to the present date has been excellent. Listing requirements for draft hoods have already been formulated, reviewed by the industry, accepted by the Approval Requirements Committee, and approved by the American Standards Association as American Standard. Similar requirements covering conversion burners and gas cocks have been developed and were placed in the hands of the industry for criticism some time ago. Just recently listing requirements for gas, pressure, and temperature, control accessories were completed by the last subcommittee listed above and distributed to all company members of the Association for criticism.

So inclusive was the scope of the work of the Subcommittee on Listing Requirements for Gas, Pressure, and Temperature, Control Accessories, that several lesser groups were organized, each charged with the task of drafting requirements for a different type of control accessory, the chief subcommittee acting merely to correlate and approve the submitted standards of each group. As a result, a folio of five sets of proposed requirements has been drawn up, printed, and distributed for criticism throughout the industry covering gas, pressure, and temperature, control accessories for gas appliances. The five individual sets in the group include Tentative A. G. A. Listing Requirements for:

1. Water Heater, Gas Range, and Space Heater Thermostats,
2. Pressure, Temperature, and Vacuum Relief, and Automatic Gas Shut-Off Valves,
3. Domestic Gas Appliance Pressure Regulators,
4. Electric Gas-Control Valves, and
5. Diaphragm Gas Valves.

In the proposed requirements for thermostats, aside from constructional standards which insure ample durability and strength and appropriate marking, provisions are made for performance tests concerning the leakage of gas (both from the device and past the valve in the closed position), the accuracy of dial calibration, the capacity of both graduating and snap-acting types, the "overshoot" (degree to which temperatures may rise temporarily above the adjustment point), and the effect of continued operation (25,000 to 100,000 successive openings and closings, depending upon the type and application of thermostats). In addition, requirements are included to cover the cooling cycle characteristics of snap-acting water heater thermostats and the effects of high temperatures upon the linkage and valve bodies of range thermostats.

The performance requirements for relief and gas shut-off valves are presented in four parts. Those pertaining to pressure relief valves or pressure relief elements of combination valves deal primarily with relieving and reseating pressures, leakage, and resistance to deterioration by hot

(Continued on page 479)

Memorial Tribute To Henry C. Morris*

By T. R. Weymouth

THE highest ornament of any calling is the character and devotion of the men who give it leadership. By this token, the gas industry stands high in human achievement, for when we consider the character and devotion of such men as Henry C. Morris, we can well understand the source of this industry's exhaustless vitality and its enduring stability.

Henry Morris was more than a member of this Association; he was one of the architects and at the same time one of the great timbers of the structure, part of the foundation and a pillar of the super-structure as well. That is why the building was so sturdy! And this also is why his removal has torn from out the very heart of the citadel something so basic and something so fundamental.

"In every parting there is the image of death." But in the case of death the parting leaves us with a truer image of him who has departed. From the vantage point of a changed perspective, through the mystic glass of hallowed memory, with sight unhampered by the thousand complications that beset the mortal view and stand between us and the living man, we now see, as with crystal clarity, the deathless qualities of our friend. The flames of sorrow, like the silversmith's furnace, have burned out the dross from our earthly sight and we behold with untarnished brilliance the pure metal of his soul.

Henry Morris was valiant and courageous, with deep wisdom and a prodigous mentality. The struggle which life handed him was the struggle which made him great. His life was a matchless sermon in successful accomplishment against odds. Fate set him a task given to but few men. He was required to fight the battle and at the same time fashion his own weapons while he fought. He patterned the very tools with which, blow by blow, he hammered out the design of his own life. It would have been a worthy, an honorable and a successful career even had it been launched with the usual opportunities and normal equipment which garnish the careers of the ordinary run of men. But when the obstacles that lay in the path of Henry Morris are considered, it can truly be said that he turned in a magnificent result. And when he faces the Judge in the Court of Final Awards, Henry Morris need make no apologies, no, not a single excuse, for the man he created out of himself. Be strong! This was the essence of our friend as it was the sentiment of his favorite poem, the last verse of which follows:

Be Strong!

It matters not how deep entrenched the wrong,
How hard the battle goes, the day how long;
Faint not, fight on—tomorrow comes the song!

May the song be his today and in this complex time, when human nature falters and fails, may we be glad that we lived in the same age and on the same earth with a man like Henry Morris.

*Address before Managing Committee, Natural Gas Department, American Gas Association, Chicago, Ill., Sept. 25, 1933.

McCarter Awards

William Streit

TWO employees of the Western United Gas and Electric Company have been presented with Thomas N. McCarter awards for reviving persons overcome by gas through application of the prone pressure method of resuscitation. They are William V. Streit, an employee of the refrigeration service department, Wheaton, Ill., and Frank Spoden, shop foreman, Glen Ellyn, Ill.

Both accidents happened in Glen Ellyn and in each case the victim was a housewife. In saving the life of one, Mr. Spoden was assisted by Mr. Streit, Albert Spoden and Kurt Krueger. Frank Spoden was awarded a McCarter Bar; he previously had received a McCarter Medal for life-saving. The three who assisted him were presented with McCarter Certificates.

Mr. Streit was given the McCarter Medal for his success in the other case.

Presentation of the awards took place before a large gathering of Western United employees, held at Wheaton, October 2.

New Jersey Gas Association

REGIONAL Meeting is the name given to five evening meetings sponsored recently by the New Jersey Gas Association. To Newark, October 18, Allenhurst, October 19, Atlantic City, October 20, Hackensack and Camden, October 24, came 850 members and friends to hear about and talk about the problems of interest to every gas man.

Except entertainment, the program was the same at each meeting. Three papers, especially prepared by selected persons, were read:

Customer Contact from a Customer's Viewpoint.
Low Demand Water Heaters.
The Manufacture of Gas.

The program of regional meetings is a result of a conviction that the association must justify its existence. Annual conventions and general committee activity provide expression for many members, but there are many others who are unable to take part in meetings held in the day at remote points. Regional meetings, held in the evening, and at convenient points, it has been found, provide an opportunity for all members to take part in association activities.

Observations of Shade Trees in the Vicinity of Gas Leaks

By Carl G. Deuber

Assistant Professor of Plant Physiology, Yale University

IN two previous articles,[1, 2] the results of a series of controlled laboratory studies of the behavior of seeds and small trees subjected to a variety of treatments with illuminating gases, ethylene and the vapors of ethylene chlorhydrin were reported. During the course of these investigations field observations were made of shade trees known to have been variously influenced by escaping illuminating gas in the soil. The field observations were made independently and are therefore of limited scope since neither the time nor the means for making extensive surveys were available.

The chief object of the field observations was to see if the laboratory findings would help toward a better understanding of the responses to be noted in shade trees growing in the vicinity of gas leaks in the soil. The complexity of the field problems connected with the accurate and early detection of shade trees undergoing not only the initial but also the later stages of the responses to illuminating gas in the soil is well known. These problems are concerned with large trees and with soil and other physical conditions which make controlled experiments on the same scale and with the contributing conditions impossible. Therefore considerable reliance must be placed upon case histories followed in the field.

The laboratory work indicated that illuminating gases could bring about at least three well-defined classes of response in the seeds and trees investigated, namely, stimulative, slightly injurious and killing effects. Emphasis has been placed on the stimulative effects for two reasons. First, they are much less understood than the injurious effects of illuminating gas on vegetation, and second, they may be of real value in the diagnosis of trees only slightly affected by gas in the soil. The early recognition of the preliminary symptoms in trees affected by gas in the soil is considered to be essential to any successful application of remedial measures.

Starting with the winter to early spring period, the laboratory findings in the study of small trees indicated a marked acceleration of bud activity leading to an early development of foliage under certain conditions. The time necessary for making extensive surveys of street trees during the early spring was not available. Therefore an opinion on the adaptability of this precocious leaf development feature of shade trees as an early symptom for diagnosing the preliminary effects of gas in the soil cannot be given. It is recognized, however, that early leaf development may be due to differences in age and vigor between neighboring trees and to differences in exposure to sunlight and other environmental factors. Several American elm trees that were known to have been badly injured by a gas leak in 1932 were found to be backward in the unfolding of the scant crop of leaves in the spring of 1933. This might be expected since the stimulative responses to the gas have passed and only inhibitory or injurious effects would be given expression in such trees. Unusually early foliage development would more likely be found in trees influenced by minor gas leaks or when the leak has existed for a short time. This feature of early leaf development appears to have possibilities in checking the effects of known minor leaks that occurred during the preceding season.

A second feature closely related to the above was observed in trees that had suffered considerable injury from gas in the soil two or more years previously. This consisted in the production of numerous adventitious leafy sprouts along the larger branches and limbs. This condition was found to be particularly prominent in American elm trees, but was also observed in several other species. Apparently this response results when the normal terminal and lateral twigs are injured severely and considerable defoliation of these parts occurs. A limited amount of the active gas ingredients probably reach the outer tissues of the larger branches and limbs and bring about a stimulation of a number of the dormant buds present. These develop into short, leafy shoots which may give the branch a "feathered" appearance. In one American elm tree of approximately 24 inches diameter a general defoliation was observed during the summer of 1931. In the following spring, the only foliage to develop on this tree was confined to two small clumps of sprouts arising at two healed branch stubs on the main trunk, 6 and 8 feet from the ground. Phenomena of this type suggest certain peculiarities in the conduction or diffusion of the physiologically active gas ingredients. This development of short leafy shoots in great numbers along main limbs and branches may, however, result from other causes. Several large, mature American elm trees have been observed showing this feature as well as a stag-headed top in situations in which there was no reason to suspect gas in the soil. In several instances there was an extensive girdling of the bark at the base of the trunk and in one the conditions for continued growth of the large tree along the curb was obviously inadequate.

Epinastic growth or the assumption of an inclined position of leaf petioles similar to the well-known tomato plant test for the presence of illuminating gas in greenhouses has been observed in a few shade trees. The most striking example of this was found in a Norway maple tree that appeared to have been very rapidly

[1] Deuber, C. G. Accelerating seed germination with gas. Amer. Gas Assoc. Monthly *15* (August) pp. 313-315. 1933.

[2] —— ——. Stimulative effects of gas on small trees. Ibid. *15* (September) pp. 380-383. 1933.

Figure 1

Large branches of an American elm tree densely covered with small twigs. This tree was suspected of being injured by gas at least five years before this photograph was taken

Figure 2

Top of a sugar maple tree with sparse foliage. Small leaves on short twigs have developed along the branches. Gas leaks occurred in the vicinity of this tree three or more years ago

Figure 3

American elm trees with clusters of small leaves along the main branches and a dying-back of the branch extremities. Extensive girdling of the bark was found at the ground level of the foremost tree

killed in midsummer by a large gas leak. When examined, the foliage of the entire tree was dry and brown, but not shriveled and the leaf petioles were directed downward.

The basal and older leaves of tomato plants exposed to illuminating gas frequently drop off from the stem in two or three days after such treatment. This is due to the development of an abscission layer at the petiole base. The shedding of shade tree leaves cleanly cut off from the twigs by a well-formed abscission layer in midsummer has been noted a number of times. One American elm tree shed practically the entire current season's growth of twigs, many of them with attached but dry or partially dry leaves. The basal ends of the twigs indicated that the abscission layer had been completely formed. Leaf and twig shedding can be considered under the head of stimulation phenomena only in so far as the cells comprising the abscission layer are concerned. These cells are initiated into unseasonable activity.

Figure 4

An American elm tree with very dense clusters of small leafy twigs along the main branches. The soil space appears to be inadequate for the maintenance of this large tree

Mention might also be made of the very peculiar division of injured and non-injured portions of some shade trees indicating that the active gas ingredients may be largely absorbed by certain roots and pass directly to the branches above. Cross transfer of these ingredients in the trunk appears to be very limited. This condition was most frequently found in maple trees.

Although lenticel hypertrophy or the proliferation of root parenchymatous cells was noted in many cases during the laboratory studies no field observations of root symptoms connected with the presence of gas in the soil about established shade trees were made. It should be noted that deficient aeration of the soil will also promote active division of the cells in root lenticels and in the root parenchyma.

In conclusion it may be stated that the responses of shade trees to the presence of illuminating gas in the soil may become evident in a variety of ways. It is suggested that the beginning stages of the responses may be stimulative in character. If this is the case, such symptoms should be of value in the early detection of shade trees likely to be injured or killed by prolonged exposure to gas in the soil. A limited number of shade tree gas cases were described to illustrate the points raised in this report. The significance of the symptoms emphasized must await more extensive observation and preferably by men who know local shade tree conditions and have information of the previous occurrence of minor as well as of large gas leaks.

Five Additional Sets of A.G.A. Requirements Approved as American Standard

TWELVE sets of American Gas Association requirements have been approved by the American Standards Association as American Standard; the last five to be approved follow:

Approval Requirements for Gas Ranges Z21.1 —1933 (Sept. 1)
Approval Requirements for Hot Plates and Laundry Stoves. Z21.9 —1933 (Sept. 1)
Approval Requirements for Gas Water Heaters ..... Z21.10—1933 (Sept. 1)
Approval Requirements for Gas-Fired Space Heaters..... Z21.11—1933 (Sept. 18)
Listing Requirements for Draft Hoods Z21.12—1933 (Sept. 18)

Recognition as American Standards was previously granted some time ago to the A.G.A. Approval Requirements for Flexible Gas Tubing, Hotel and Restaurant Ranges, Private Garage Heaters, Clothes Dryers, Incinerators, and Gas Heated Ironers, as well as to the A.G.A. Requirements for Installation of Conversion Burners in House Heating and Water Heating Appliances.

The differences between the four new sets of approval requirements and the corresponding sets of A.G.A. requirements which they supersede are not of a vital nature. The most pronounced changes involve the extension of the requirements for water heaters, hot plates, laundry stoves, and space heaters to embrace separate standards both for appliances designed to burn propane gas and for appliances designed to consume butane-air fuel supplies. The requirements for gas ranges, approved as American Recommended Practice in 1932 had already been broadened in this particular, and hence required no extension before submission to the American Standards Association.

In recent years, the liquefied petroleum gas industry of the United States has grown to such an extent that today over 134 separate communities are being served with propane gas or butane air mixtures.

To supply the gases required for testing appliances with liquefied petroleum fuel supplies, the Testing Laboratory has constructed a completely automatic butane-air mixing plant, capable of producing, at the rate of 1,000 cu.ft. per hr., a butane-air mixture of 525 B.t.u. per cu.ft. and 1.16 specific gravity. Propane gas of 2,500 B.t.u. per cu.ft. and 1.55 specific gravity is procured from steel pressure cylinders and fed to appliances through special pressure regulators.

The Listing Requirements for Draft Hoods are entirely new. In these requirements, construction standards insure sturdy and convenient design, and performance requirements regulate capacity, resistance to chimney drafts, relief when flueways beyond the device are completely blocked, and spillage of flue products under normal operation. Also, suggested designs are given for both vertical and horizontal type draft hoods.

All five of the new sets of requirements were recently printed and distributed throughout the industry. Additional copies may be secured upon application either to the American Gas Association, 420 Lexington Avenue, New York, N. Y., or to the American Gas Association Testing Laboratory, 1032 East 62nd Street, Cleveland, Ohio.

TESTING LABORATORY

R. M. CONNER, Director

Managing Committee: J. S. DeHART, Jr., Chairman N. T. SELLMAN, Secretary

Research Points Way to Silent Industrial Gas Utilization

By D. W. Chapman

Member, Committee on Industrial Gas Research

IT is gratifying to report that as a result of three years of extensive research conducted at the Testing Laboratory of the American Gas Association, in Cleveland, under the direction of the Committee on Industrial Gas Research, definite and practical means have been developed for the elimination, or reduction to a minimum, of noise produced by industrial gas combustion systems.

An initial bulletin covering the findings of the first phases of this research was published in October, 1932, under the title of "Research in the Elimination of Noise in Industrial Gas Burners; Noise Produced by Industrial Gas Burners as Affected by the Mixture Burned and the Character of the Installation Preceding the Burner Body," Report No. 692.

The investigation of this subject was practically concluded during the past Association year and a second bulletin was recently published and distributed covering the elimination of "Noises Produced by Industrial Gas Burners as Affected by the Features of Burner and Tunnel Design," Report No. 724. Copies of either or both of these bulletins may be obtained from the American Gas Association, 420 Lexington Avenue, New York City.

A thorough investigation of this problem was possible only after the adaptation of the noise gaging instrument, known as the audiometer, to the particular type of noise measurement required in this study. Testing was carried out by varying, in turn, each of the many factors involved in industrial gas combustion, as all others were maintained constant, and noting the resultant effect upon the noisiness of the open flame. It is significant that nearly every factor involved in gas utilization was found to affect combustion noisiness to some extent.

It was found, for example, that noise increased with B.t.u. input almost regardless of the type of installation. Further, it was shown that noisiness was proportional to ignition velocity of the gas burned. Thus, changeovers from faster to slower burning gases tend to effect noise abatements, and vice versa. Preheating was found to augment noisiness, while noisiness decreased when the ratio of primary air to gas in the burning mixture was varied in either direction from that at which maximum ignition velocity occurred. Abating noisiness by these effective means, however, is not always feasible, for the gas rate is usually regulated by the amount of work to be done, and the kind of gas used is determined by the supply available. In addition, the air-gas ratio is generally fixed by the furnace atmosphere and heating efficiency required. Therefore, factors other than those inherent in the mixture being burned also necessitated study.

Other than the items just mentioned, two characteristics of the gas-air mixture stream at the point of combustion were found to affect noisiness. These were (1) the degree of intimacy of mixture of the gas and air, and (2) the degree of turbulence or agitation existing in mixture streams at the point of ignition. The first of these items, the completeness of mixing, could be influenced by manifold design, although, strangely enough, not by the type of proportioning device employed. Better mixing, when it could be promoted, assisted in noise elimination. With respect to the second factor, the most important of all noise-influencing variables, it was found that any variation of any factor whatsoever which tended to reduce the turbulence in the burning mixture tended also to appreciably reduce noisiness. Either relatively long, smooth, straight burner bodies or correctly designed finning within short burner bodies could be effectively employed in establishing the vital "straightening" or elimination of turbulence in mixture streams. Burner bodies, 8 diameters in length, were shown to be sufficient when no fins were included in the system. When fins of the complete cross type were used, however, neither fins nor containing burner bodies needed to be longer than 2½ diameters. Further, wherever "straightening" was established prior to the port, it was necessary to so design the port approach or transition from body to port so that straightening would not be destroyed by sudden or curved constrictions to the port. Conical port approaches, including total angles of twenty degrees or less, were required in order to avoid partial destruction of straightening with body-to-port diameter ratios in excess of two.

Investigations in which a series of burners similar in every respect, except capacity, were tested, revealed that noisiness may often be reduced appreciably without sacrificing capacity or turndown by simple replacing many small burners by a fewer number of larger ones of similar design. This conclusion, which has been carefully checked, is contrary to the opinion formerly held by many designers and engineers. Single burners of large port area were universally less noisy than similar single burners of small port area when operated at the same input, irrespective of whether the burner body size or body-to-port ratio was held constant as the port size was varied. With regard to a port of given area from which air-gas mixtures were burned at a given rate, it was shown that less noise occurred when the port area was distributed into many small, long, adjacent ports. In addition to this, considerable variation in noisiness at a given input was noted between different burners using different methods of combustion, e.g. tunnel, flame-retention, multiple-port, surface, impact, premixed, two-stage, Bunsen, nozzle-mixing, port-mixing, and diffusion-flame types of combustion.

An additional phase of the problem of gas burner noise abatement relates to the effects of tunnels on the intensity of burner noises. Steps from the port exit to the tunnel entrance were found to be necessary, but from a noise standpoint, were found to produce unnecessary noise if in excess of 1/16 inch. No important differences in noisiness were noted between correctly designed conical and cylindrical tunnels. In every case noisiness increased with tunnel length as well as with the angle of divergence of conical tunnels and the diameter of cylindrical ones. Practical considerations, of course, limit variations of these dimensions. As a final item, the conditions under which tunnel resonance and special objectionable tunnel noises were most likely to occur were given careful consideration. Again the elimination of turbulence in port mixture streams played an important role.

Broad as is the scope of the work outlined above, and treated at length in the most recent bulletin of the Committee on Industrial Gas Research, it must not be inferred that all subjects associated with industrial gas furnace noisiness have been treated. Studies of the effects upon total furnace noisiness of the combustion space, the flue, and the furnace structure will be required to entirely understand the whole problem. Nevertheless, much information of value to those desiring either to construct new silent equipment or to modify existing noisy installations has been disclosed, and another important step towards "improving the utilization of gas in industry" has been taken.

Publishes New Basic Data on High Temperature Combustion

By E. E. McCormick
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FOR years the question of how much gas can be burned in a given combustion space, and what factors influence this quantity, has puzzled industrial gas utilization engineers and impeded progress in industrial gas furnace design. However, in a recent publication of the Committee on Industrial Gas Research of the American Gas Association, entitled "Research in Fundamentals of Combustion Space Requirements in High Temperature Gas Furnaces," First Bulletin, Report No. 723, this question receives a full and significant answer based upon two years of intensive research conducted at the American Gas Association Testing Laboratory in Cleveland. Additional items, such as the development of an original method whereby the size of flue required to yield a given furnace pressure can be calculated from fundamental data, as well as a study of the effects of different flue designs on furnace, wall, and flue temperatures, are also included in this publication. Copies of this bulletin may be secured upon application to the American Gas Association, 420 Lexington Avenue, New York City.

Early in the investigation, one fundamental conception of high-temperature combustion of gas was found to underly every relationship or conclusion reached. This conception hinged upon the impossibility of obtaining absolutely neutral combustion conditions, i.e., combustion such that the products contained neither any oxygen nor any unburned combustibles whatsoever. However, by considering neutral combustion as combustion yielding products containing no more than 0.05 per cent of O_2 (excess oxygen) and no more than 0.05 per cent of CO plus H_2 (unburned combustible), and complete combustion as combustion yielding products containing no more than 0.05 per cent of one of the above two constituents, then accurate basic relationships concerning the quantities of heat that can be liberated by complete combustion under varying conditions could be determined.

It was found that for all arrangements of equipment tested, neutral combustion, as defined above, was possible only below a heat input limit of 100,000 B.t.u. per hour per cubic foot of combustion space. As inputs were increased above this value, however, complete combustion, as defined above, was possible under certain conditions. These conditions were that quantities of either O_2 or CO plus H_2 (whichever constituent was not restricted to concentrations below 0.05 per cent in order to secure complete combustion), be present in the flue gases in concentrations in excess of a certain limit, dependent upon the input and the installation. This limit in all cases investigated became larger as the input per unit of combustion space was increased, although the higher the input per unit of combustion space, the lower was the rate of increase of the limit. Thus, in high temperature gas combustion, at any given input to a particular installation, some fixed measurable amount of excess O_2 is required if all but 0.05 per cent of the CO plus H_2 is to be consumed.

As a result of investigating the above fundamental relationships under various test conditions, many practical conclusions were reached. For example:

1. Although in no case tested could neutral combustion be attained at inputs greater than 100,000 B.t.u. per hour per cubic foot of combustion space, complete combustion seemed to be attainable at any input below some extremely high limit dependent upon the installation. In no case was this limit obtainable at the Laboratory. Complete combustion was, however, secured with input rates as high as 4,000,000 B.t.u. per hour per cubic foot of combustion space.

2. For a given input and installation the quantity of CO plus H_2 required for complete combustion under reducing conditions seemed to be the same as the quantity of excess O_2 required for complete combustion under oxidizing conditions.

3. The higher the average flue gas temperature the greater was the amount of excess O_2 required to attain complete combustion. Indications are that this relationship is independent of both input and installation. On the basis of this fact, it has been induced that the dissociation of CO_2 and water vapor and the amount of excess O_2 required for complete combustion are closely related.

4. At a given input per unit of combustion space, the average flue gas temperature and the amount of excess O_2 required for complete combustion both increased with the cross-sectional area of the combustion chamber. The length of the combustion chamber seemed to exert little, if any, effect.

5. For a given input and installation, the amount of excess O_2 required for complete combustion increased with increasing burner port areas and decreased with increasing degrees of turbulence in air-gas mixture streams entering the combustion zone.

6. Other conditions being equal, nozzle-mixing burners demanded more O_2 for complete combustion than did burners of types consuming premixed gas and air.

7. For a given installation with burner consuming premixed gas and air and a given heat input, the quantities of excess O_2 required to completely burn natural gas and coke oven gas were practically identical. For installations employing nozzle-mixing burners, however, slightly more excess O_2 was required with coke oven gas than with natural gas.

In the course of procuring the actual results reported in the First Bulletin on the subject, several test and computational methods as well as pieces of apparatus were developed which will prove of unusual interest to industrial gas engineers. For example, the A.G.A. high velocity thermocouple, which facilitates the measurement of "true" gas temperatures, the water-cooled sampling tube, which permits the drawing and cooling of samples of combustion products at any stage of the combustion process without fostering further reaction, the method of calculating and the distinctions between "observed" furnace pressure, "true" furnace pressure, and "motive" pressure, and the manner of ascertaining flue temperatures in the range above that in which thermocouples can be satisfactorily used, are worthy of note.

The basic nature of all the material discussed in this treatise on the "Fundamentals of Combustion Space Requirements in High Temperature Gas Furnaces" marks it as a particularly valuable reference which should be extremely valuable to those interested in the use of gas for industrial heating processes.

Messrs. Denning and Soper Succeed Henry C. Morris

MANY changes in personnel of the Lone Star Gas System have followed the death of Henry C. Morris, president of the Dallas and Texas Cities Gas Company.

L. B. Denning, president of the Lone Star Gas Company, was elected president of the Texas Cities Gas Company.

Chester L. May was named vice-president and general manager of Texas Cities Gas Company, which position will be concomitant with that of vice-president and general manager of the Community Natural Gas Company, which Mr. May has held since 1929.

Supervision of operations for the Texas Cities Gas and the Community Natural has been delegated to Mr. May as vice-president and general manager of both properties, and to facilitate operations the system has been divided into two divisions, eastern and western.

Merchandising activities on both Community Natural and Texas Cities Gas Company properties will be under the supervision of C. L. Trevitt.

Richard G. Soper, vice-president, was elected president and general manager of the Dallas Gas Company.

L. A. Bickel, who has been assisting Mr. Soper during the last nine years in an operating capacity, was named secretary.

ACCOUNTING SECTION

E. B. NUTT, Chairman H. W. HARTMAN, Secretary A. S. CORSON, Vice-Chairman

Analysis of Commercial Bank Statements from the Depositor's Point of View

IT has always been recognized that one of the chief duties of Treasury and Accounting officers was to safeguard the corporation's property, whether located in offices, shops or plants. Particular emphasis has been placed on the necessity of safeguarding portable wealth, especially in the form of cash, to which end vaults have been built for safekeeping of cash and other valuables of the company, and elaborate accounting systems, with provisions for internal checks and balances, have been adopted as protection against irregularities.

Similar precautions have been taken in connection with the withdrawal of deposits from banks. As protection against misappropriations and other irregularities, invoices must be approved by the purchasing agents, the department head for whom the goods were purchased, and finally, an accounting officer, as assurance against improper or duplicate payments. The check itself must be protected by a machine and be signed by an individual (usually an officer) of known integrity.

This vigilance respecting receipts, cash in the custody of the company and withdrawal of cash from banks, has not been applied to cash in banks, frequently with unfortunate results to the depositor.

A canvass of losses resulting from the breakdown of systems for handling receipts and disbursements would show that for most companies such losses have been negligible. While practically all companies under the necessity of using many depositories outside the financial centers have sustained substantial losses in bank failures, in some cases the funds tied up in banks being in excess of losses from uncollectible customers' accounts. Such a survey would indicate that losses due to bank failures are an operating problem of first magnitude and requires as much attention as any other phase of the fiscal officers' duties.

Lack of interest in the condition of banks on the part of corporation officers has not only entailed losses for their companies, but has encouraged unsound banking practices, by making it easy for banks in inherently unsound situations, under inexperienced or speculative management, to get deposits. The depositors have in this way been largely responsible for our banking troubles in the past.

There is little or no uniformity among our commercial banks. Instead of one legal control as in England or Canada, we have 50 different codes—the banking legislation of the 48 states, the Federal Reserve Act as amended, and the National Banking Act as amended. Our banks vary, as to location, between agricultural areas, industrial centers, and purely residential communities; as to the extent to which they are permitted to operate branches in the several states; as to size; as to character of the management; and consequently, as to the soundness of the institution.

Even in prosperous times bank failures are relatively common, some 4,000 banks having failed in the period 1922-28, one of unprecedented prosperity. Compared with 30,000 banks in 1922, only 16,000 are now being operated on an unrestricted basis, the decrease being due principally to failures.

In view of this high rate of mortality among our banks, it is just as essential that the depositor look into the financial condition of a bank towards which he expects to take a creditor position as it is that he investigate the financial responsibilities of a customer to whom he expects to extend credit.

The depositor can get a line on the financial condition of his bank by analyzing the statement. While the statement may not always be adjusted to current conditions, or truly representative of the bank's condition, it is nevertheless valuable as a basis of drawing direct comparisons between banks as to soundness, which is the practical problem confronting the corporation treasurer who must of necessity have banking facilities in the territory his company serves.

Analysis of the bank statement requires an understanding of what constitutes a sound bank as well as an understanding of the statement itself.

A sound bank may be defined as being prepared to meet the stresses of the two kinds that explain most all bank failures, which are, first, heavy withdrawals of deposits, and, second, losses, which may be due to poor loans, poor investments, unprofitable real estate holdings, misappropriations, burdensome operating costs, or any other result of poor management or the vicissitudes of business.

The ability of the bank to pay deposits on demand depends upon its liquidity.

The ability of the bank to absorb losses depends upon its solvency.

Both liquidity and solvency are, therefore, requisites of a sound bank, but they do not necessarily go together.

The objectives in analyzing a statement are to determine the probable liquidity and soundness of the bank. The crux of this matter is an understanding of the items on the statement.

Treasury and accounting officers are generally familiar with the content of balance sheet accounts, regardless of the type of industry, but the practice followed by banks in accounting for and reporting certain items on the balance sheet requires discussion, in order to clearly understand the bearing of these items on the liquidity and solvency of the bank.

Federal securities present a question, because of the possibility that they have been pledged to secure borrowings from the Federal Reserve Bank, Postal Savings deposits, or deposits of the Federal Government.

Miscellaneous securities, including all forms of investment securities except direct obligations of the Federal Government, present a twofold problem: In the first place, they are just as likely to have been pledged as are Federal securities, to secure a loan from the city correspondent, or the deposit of a state, municipality or other political subdivision. The second problem in connection with miscellaneous securities relates to the method of evaluating them on the balance sheet.

Since December 1931, the Comptroller of the Currency has not required that national banks write down miscellaneous securities to market prices, and the Superintendents of Banking in many states have followed this lead. Some strong city banks have adhered to the old rule of "cost or market, whichever is lower," or have set up reserves, but the majority of our banks have, under present market conditions, taken full advantage of the relaxation of the rule.

This situation has a direct bearing on both the liquidity and solvency of the bank. The banks have not been required to write off the depreciation in miscellaneous securities, and many have not done so vol-

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Editor's Note: This is a summary of a paper on the above subject which was read before the Accounting Section of the American Gas Association Convention at Chicago, September 27, 1933. Due to the interest which has been shown in the subject, and the numerous requests for copies of the article which have been received by the Secretary of the Accounting Section, it was thought advisable to print a summary of the article here.

untarily, because the write-offs would have seriously impaired their capital, and possibly even have impaired deposits. Since the banks cannot sell these securities without realizing the losses, the securities are not saleable from the point of view of the bank, regardless of whether they have a market. Therefore, miscellaneous securities valued substantially above the market cannot be relied upon as a means of raising cash immediately and should not be counted among the liquid assets of the bank, and unless the bank is considerably more than 100 per cent solvent on paper, it may not be solvent at all.

The quality of loans and discounts naturally has a bearing on the liquidity and solvency of a bank.

There are commercial or short term loans, made to finance the seasonal requirements of business. Since they grow out of self-liquidating business transactions, they are the type of loan eligible for rediscount with the Federal Reserve Bank. There are brokers' call loans, which are as liquid as loans eligible for rediscount. There are also term loans, secured by collateral; loans against real estate or real estate bonds and mortgages; and capital loans, the payment of which may be largely contingent upon permanent financing by the borrower.

The important points in connection with the analysis are that the maturity of the loan has relatively little to do with its collectibility (practically all bank loans are dated to mature in 90 days or less, whether they are eligible for rediscount or not), and that the amount of money which the bank can realize immediately from loans and discounts is dependent upon the portion eligible for rediscount with the Federal Reserve Bank, and/or the amount of brokers' call loans.

Banks make direct real estate investments, as indicated by the items, "Bank Buildings," "Furniture and Fixtures," "Other Real Estate," etc.; in addition to indirect real estate investments in the form of real estate bonds and mortgages and real estate loans, which have already been referred to.

The direct real estate investments of the bank are unliquid, and present a question as to soundness. The quarters which the bank occupies are usually highly specialized and cannot be converted to other uses except at prohibitive cost, while an office building which the bank may own may become unprofitable as a result of the construction of a competing building or from loss of revenue without commensurate reduction in carrying cost, in which case the investment will be hard to shift without heavy loss. Real estate which the bank has taken over on loans is apt to have but a limited market.

Regarding the liability side of the statement, banks seldom segregate preferred and general deposits, but frequently show a segregation of deposits between time and demand. This latter segregation is not considered of much significance in connection with the financial position of the bank, and is ignored in the analysis of the statement.

To facilitate the analysis of the balance sheet, an analysis sheet (a specimen of which appears herewith) may be used. This is simply a form for arranging the important items on the bank statement in a convenient way to determine the probable liquidity and solvency of the institution.

In analyzing the statement, the feature items, that is, those items which have a real bearing on the financial condition of the bank, are transcribed to the analysis sheet. The non-feature items which have little or no bearing on the condition of the bank such as accrued items, acceptances which may be offset against each other, etc., are ignored in the analysis.

In order to determine the liquidity of the bank, take Federal Securities (Item No. 1), if any, and, in case the bank under consideration is a national bank with circulating notes outstanding, deduct the circulating bank notes from Federal Securities, since an amount of Federal Securities equal to the circulating notes is known for a certainty to have been pledged with the Comptroller of the Currency. For lack of specific information, the balance of Federal Securities may be assumed to be free and unpledged for the purpose of analysis. To this balance of Federal Securities, add the total cash resources of the bank, to determine the amount of so-called liquid assets (Item No. 5).

The ratio of total liquid assets to total liabilities is an index of liquidity.

Item No. 5 is admittedly not the sum of all the liquid assets of the bank, since some of the loans are probably eligible for rediscount or are represented by brokers' call loans, and some of the miscellaneous securities are undoubtedly liquid, but the bank's statements seldom segregate the loans and miscellaneous securities that are liquid in fact as well as in form, so the analyst has no means of determining their amount. The known liquid assets, are, therefore, taken as the basis for determining the liquid ratio of the bank in order to compare its liquidity with that of other banks.

To determine the current position of

BANK ANALYSIS SHEET

(000 Omitted)

Account with..... Name of Bank.....

Correspondent..... Location.....

DATE OF STATEMENT		(DATE)
No.	*Feature Items*	$
1	FEDERAL SECURITIES	
2	Less: CIRCULATING BANK NOTES	
3	NET FEDERAL SECURITIES	
4	CASH RESOURCES	
5	TOTAL LIQUID ASSETS	
6	MISCELLANEOUS SECURITIES	
7	LOANS AND DISCOUNTS	
8	TOTAL CURRENT ASSETS	
9	DEPOSITS	
10	BORROWINGS, REDISCOUNTS, ETC.	
11	TOTAL LIABILITIES	
12	CAPITAL	
13	SURPLUS AND UNDIVIDED PROFITS	
14	TOTAL CAPITAL FUNDS	
15	Less: REAL ESTATE, VAULTS, ETC.	
16	NET CAPITAL FUNDS	

RATIOS	%	RATING
LIQUID POSITION:		
Liquid Assets to Total Liabilities (5 ÷ 11)		
CURRENT POSITION:		
Current Assets to Total Liabilities (8 ÷ 11)		
STOCKHOLDERS' POSITION:		
Net Capital Funds to Total Liabilities (16 ÷ 11)		
FINANCIAL POSITION OF BANK:		
As Indicated by Above Ratios		

(An analysis sheet to be retained as a permanent record should provide a sufficient number of money columns to accommodate the statements published by the bank over a period of a year or two, so as to disclose the trend of the bank.)

the bank, take the total of so-called liquid assets (Item No. 5) and add miscellaneous securities (Item No. 6) and loans and discounts (Item No. 7) to get a total of current assets. This accounts for all feature assets except real estate, which is eliminated from further consideration by being cancelled against capital funds.

This treatment of real estate may seem at first severe. The depositor recognizes, however, that the bank will require some real estate for the conduct of its business, but since real estate investments of the bank should never tie up a large proportion of its capital, the depositor may feel justified in deducting real estate from capital funds and then seeing what the bank looks like.

The ratio of total current assets (Item No. 8) to total liabilities (Item No. 11) gives the current position of the bank, which is an index of solvency.

The analysis sheet also shows "Stockholders' Position" which is determined by the ratio of capital funds (exclusive of real estate) to the liabilities. This is another formula for expressing the solvency of a bank.

If the current ratio is, say, 110 per cent, it means that the bank has $1.10 of current banking assets for every dollar of deposit and other liabilities. If this is the fact, the bank must have 10 cents of net capital funds for every dollar of liabilities. A current position of 110 per cent, therefore, means precisely the same thing with reference to the bank's solvency as a stockholders' position of 10 per cent. Both ratios indicate the extent to which the bank is prepared to absorb losses without impairing deposits.

The principal merit of this system of analysis is that it enables the depositor to reduce all banks to two common denominators, to put them all on the same basis, and to draw direct comparisons between them as to liquidity and solvency. If the analysis of the statements of two banks indicated that the first had a liquid ratio of 30 per cent and the second, 20 per cent, the depositor could say that the first bank was the better prepared to meet the demands of deposit withdrawals. If the first bank had a current ratio of 120 per cent and the second had a current ratio of 110 per cent, he could also say that the first bank was prepared to absorb a larger percentage of losses than the second bank, and was on the whole, a sound institution. But the depositor could not say whether the condition of either bank was good, bad, or indifferent, because his conclusions were wholly comparative or relative. In order to arrive at more definite conclusions, it would be necessary to make a detailed examination of the bank's affairs.

The defects and limitations of this system of analysis are due largely to lack of information in bank statements, and the conclusions are no more reliable than the statement on which they are based. The depositor probably would not be justified in placing more reliance on this system of analysis than he had to, but that would mean that he would rely upon it entirely with respect to many banks, since it is only in exceptional cases that reliable inside information as to the condition of a bank is available to the depositor. The correspondent bank, incidentally, is generally the best source of such information.

Despite its limitations, this system of statement analysis has proved valuable to the utility system that developed it, which operates in widely diversified areas and has from 500 to 600 depository banks. By comparing the results of the analysis of such a large number of banks, it was possible to determine a code for rating banks, A, B, C, D, and E, so that any individual bank could be compared with all other banks in the community or wider area. The selection of the best available banks is the essence of the problem that confronts the treasury officials of such a utility system, which is under the necessity of using banking facilities in the territory served, and, to keep losses at a minimum, must use the best banks that are available in that territory.

In the opinion of the treasurer of this utility system, lack of intelligent interest on the part of the depositors in the condition of banks has been a contributing cause to our banking difficulties. Some solvent country banks were no doubt forced to close before the moratorium because large depositors became panicky and set about at the last minute to concentrate funds in the financial centers. If the depositor would follow the condition of his depositories at all times, the necessity of acting hastily would be eliminated. Also, if the depositor regularly carried his funds in banks which he has some reason to believe are safe, he would increase, rather than lessen, the stability of the banks.

Laboratory Inspectors Visiting Appliance Manufacturers' Plants

THE annual appliance inspection program of the American Gas Association Testing Laboratory was inaugurated this year, on October 1, when four Laboratory representatives left Cleveland, Ohio, to visit more than 150 gas appliance manufacturing concerns before January 1. Inspection of the products of manufacturers in the Pacific Coast area will be taken care of during the same period by Laboratory representatives from the Los Angeles branch.

Production models of all appliances listed by the American Gas Association as complying with A.G.A. Approval Requirements will be carefully inspected at each plant. Thus, as in former years, all appliances possessing current approval by the American Gas Association as a result of exhaustive tests previously conducted at the Testing Laboratory, will be checked on the floor or production line for continued compliance with the standards upon the basis of which approval was granted. Approval will be withdrawn from those models which fail in any way to conform to the design of the appliance upon which approval tests were originally executed. If no alterations of design or assembly have been made approval will be renewed.

This year the customary inspection will be more rigid than ever, and in a few cases unheralded second or third calls may be made, in order that throughout the ensuing year of gradual national recovery, the gas industry may contribute to national progress by assuring, more definitely than ever, the vast gas consuming public of equipment which conforms with modern concepts of safety, efficiency, good design and workmanship. Special attention will be accorded to details of appliance construction and assembly, although elements of design and operation will continue to be carefully inspected. This increase in rigidity of the 1933-34 American Gas Association Testing Laboratory Inspection Program was suggested and authorized at the June meeting of the Laboratory Managing Committee at which time it was unanimously agreed that "the Laboratory should decide where special investigations of this (more strict and comprehensive) nature were necessary and make them, removing the names of any concerns from the list of Approved Gas Appliances found to be willfully violating the Association's rules."

These periodic inspections on the part of the Laboratory have proven to be extremely valuable to manufacturers in the past and it is the intention of the Laboratory Management to make them more effective and of more assistance to all companies as time goes on.

Manufacturers who have problems relating to proposed changes in their products, new appliances, or any other matters associated with the approval of their equipment are urged to take advantage of any information or advice which the Laboratory Inspectors are able to supply. Extensions of approval to new models of appliances may be taken care of at the time of the inspector's visit where no material change in the appliance affecting its safety, durability, or performance has been made.

Manufacturers of appliances are to be highly commended for their cooperation with the Association's testing and inspection program in the past in the interest of the gas industry and the public which it serves.

COMMERCIAL SECTION

N. T. SELLMAN, Chairman J. W. WEST, Jr., Secretary F. M. ROSENKRANS, Vice-Chairman

What Price New Business?*

Morse DellPlain

By Morse DellPlain

Northern Indiana Public Service Company
Hammond, Ind.

SPEAKING recently in the House of Commons, David Lloyd George, Great Britain's wartime Prime Minister said, "There are three experiments now proceeding, on the success or failure of which the whole outlook of the world depends—the Russian, the Italian and the American. The American is the most important." Let us just briefly analyze this statement and determine for ourselves what Mr. Lloyd George means when he says the American experiment is the most important. In Russia we have the rule of the so-called proletariat. Theoretically at least, the wage earner, the common laborer, is in control. In Italy, the reverse applies. No semblance or even pretense of democratic rule remains. The iron hand of dictatorship controls government, capital and labor.

In America neither extreme is contemplated. We are attempting to recognize all elements—capital, labor and consumer, as integral parts of our economic whole. The power of government is being used in a supreme effort to prevent a recurrence of those breakdowns which history would indicate are inevitable without some coordinating agency. Impartial observers agree that the one fundamental which will make the American experiment the success intended for it is that industry shall earn the necessary margin which will enable it to pay wages adequate to give the buying public an ample purchasing power to provide itself with the necessities and amenities of modern life.

The gas industry is the provider of a service that ranks foremost among these necessities and amenities. This means that we have a very definite interest in the outcome of the movement and must assume a corresponding responsibility to accelerate the advance of the fundamental N. R. A. idea. The greatest direct contribution which we can hope to make to the success of this great economic experiment is the adoption within our individual companies of a sound aggressive new business policy. We are challenged to put our business on a profitable basis despite rate reductions, despite the handicap of a lessened ability to finance development programs by means of outside capital, and despite the threatened increase in almost every item that enters into the cost of rendering service. Notwithstanding all of this, the fundamentals of our business are the same today as they were yesterday and if our executives will display the necessary energy, aggressiveness and flexibility of mind, we shall still do our part in the face of new conditions, and when I say "executives" I refer to sales executives as well as others.

Getting Additional Load

The average manufactured gas system is badly underloaded. Carrying this idle investment, in itself, may be the difference between a profit or a loss. This fundamental idea will indicate to you a very obvious new business policy—more load on the present system. Present capacities having been determined, a new business program is formulated to use these capacities to the limit. Preparing such a program means finding the answer to several fundamental questions with reference to our own particular situation. How much can we afford to spend to get this additional load at a reasonable profit? Spending this money may take the form of a realignment of our rates to make additional uses attractive to more people, thus calling for a temporary sacrifice of revenues from present users. Obviously, the adoption of promotional form of rates is a very necessary preliminary to any aggressive load-building program. What are the base and incremental costs of gas in our particular system? What are the base and incremental uses of gas as determined by local acceptance? How much can we afford to spend in direct promotional expense to pioneer new appliances which cannot possibly be sold in effective volume at a merchandising profit? There must be no haphazard thinking in finding the answers to these questions.

I wonder how many men here today know how much every dollar of added residential revenue secured by the sales department is costing in new business expense? If I should ask for the answer in terms of merchandise volume, or appliance sales per meter, or even in terms of percentage of gross revenue, it would be much easier to have the answer. However, in my opinion these latter measuring sticks are not true gauges. The real story can be gotten only by translating the appliances sold into the revenue which those particular appliances produce under our own particular rate schedule, and then determining what ratio this revenue bears to the total amount of money spent to secure that additional revenue. This ratio is the proper gauge as to whether we are spending the correct amount for new business effort. What should this ratio be? One prominent utility sales executive advocates that his company spend the full first year's estimated revenue for load added to existing lines. This might be a good figure for us to experiment with in the gas business. Personally, I am inclined to think it is too high for normal conditions. To indicate a standard ratio for our business is impracticable because it must necessarily be a variable, based on localities, existing rates and local business conditions. The locality determines the character of the needed incremental business. The existing rate determines the "spread" available for promotional purposes. Local business conditions govern the degree of resistance likely to be encountered in securing the load.

It is surprising the amount of loose thinking one encounters on this subject of new business costs. Too frequently we hear someone in all seriousness suggest that because we are prepared to make a capital investment of approximately four times the estimated annual revenue to secure business on a proposed extension, we are equally justified in spending four dollars in new business expense to secure one dollar's additional revenue on existing mains. The failure to appreciate the distinction between a capital investment and an operating expense shows a lack of knowledge of fundamentals which might be humorous were it not fraught with so much danger to the business.

Delay May Prove Fatal

To arrive at sound conclusions in the study of new business economics we must have in mind a clear line of demarcation between capital and operating charges. Generally speaking, this is no time to make capital expenditures, but with our present under-loaded systems I believe it to be good business judgment, if we can possibly raise the money, to spend generously to increase load on existing mains, allowing the matter of reaching out into new territory to await the dawn of a more propitious day. Allow me to suggest that liberal appropriations can profitably be made for intensive sales effort over the next few months to bring back to our mains customers who have had to give up the use of gas during the past few years. Delaying this program too long may prove fatal.

* Address before Commercial Section, International Gas Conference and Fifteenth Annual Convention of the American Gas Association, Chicago, Illinois, September 27, 1933.

We, as an industry, must develop a new conception of service standards. Our thoughts on service in the past have been confined largely to the matter of the quality or the pressure of the gas itself, with some perfunctory standards as to the servicing of the appliances. I feel that we can well devote considerable attention to impressing our public with the desire of the gas company management to maintain the most cordial of contacts with its customers. We should go to the extent of doing things for them which, under ordinary conditions, should not be expected of a private business but which are expected from a public service corporation operating by virtue of a public franchise and dependent upon the general public for its very existence. We must bend over backwards, so to speak, to impress our customers with our interest in having our service as nearly perfect as possible. Public acceptance of our product will be directly proportional to the quality of our over-all service.

A restricted advertising program for purposes of economy is an economic mistake, in my opinion. Newspapers are the eyes and ears of society. Because it reaches more persons than any other medium, the newspaper is the means through which we should tell our story. Most people in the community read little except their local newspaper, and the presses of the country turn out nearly 40,000,000 copies daily for these readers.

Local advertising—advertising that brings home to the consumer the fact that the utility truly is a part of his community and usually one of the largest taxpayers in it—is vital to the industry. This advertising should emphasize particularly the service rendered and the desire of the company to truly meet the demands of the community; demands not only for therms of gas, but also for the rounded additional services for which the customer pays in his monthly bill.

The only way to build up incremental use is by securing the acceptance of new load-building appliances which the ingenuity of our scientists and the trend of reduced rates are making available to the general customer. The breaking down of initial resistance to a new appliance through persistent newspaper advertising greatly reduces the ultimate sales cost.

You will find also that the former customer who may have had to give up the use of gas during the past few years is still reading his local newspaper. His newspaper is one of the last of the necessities which he will surrender. If we are to regain the load that will come from reconnected services we must, among other things, continue to tell our story through the local paper.

While there have been many complaints directed against the private utility, the American public is essentially fair-minded and if the facts are placed before it fairly, the utilities as they are operated today should have nothing to fear, and the newspaper is, in my opinion, the best medium through which to give these facts to our public.

More Patience Needed

Any discussion of a proper new business policy for a gas company could not possibly be adequately covered without some reference to the question of whether or not a utility should merchandise appliances. I am opposed to gas utilities retiring from the appliance sales field. I think it is a political expedient which is basically unsound. No business can develop beyond the public acceptance of its product. If, through not buying gas appliances, the public is educated to prefer other fuels, or no active steps are taken to teach our present customers additional uses of gas, the gas industry has not the slightest chance for development. Discontinuing merchandising has been tried before. Experience has proved it to be just an opiate in the form of a political concession which may bring us temporary relief. But at what a price! There are several utilities which have discontinued merchandising at some time or other, only to resume with the realization that swallowing a political pill will not cure an economic headache. A clearer view of the consequences, more patience, and a full consideration of the whole problem will produce much sounder results.

The active movement to legislate the gas companies out of the appliance field was started by certain dealer organizations originally as a protest against some of our merchandising practices and later, in the first flush of the depression, as an attempt to secure more business for themselves. Nationally, we have been able to arbitrate our differences with the two dealer organizations from which the greatest outcry came. The American Gas Association through its Principles of Merchandising has formulated a code acceptable to those dealer groups. This is first-hand evidence that dealers want us to remain in the business of selling appliances so long as their causes for grievance are removed. Many gas companies today are observing these principles and enjoying amicable relations with these dealer groups, thus gaining political prestige without sacrificing economic advantage.

The fallacy that the dealer would gain the business surrendered by the gas company has been established time and time again both in those states where it is illegal for the utility to merchandise and in those communities where gas companies have experimentally withdrawn from retailing or eased up in their efforts. After several years of aggressive storage water heater promotion in one of our districts, we, as an experiment, withdrew from the field and turned the business over to the dealers. As the momentum of our effort subsided, the volume of water heater sales dropped until the dealers were actually selling less water heaters when we were out of the business than they were with us in it. They came to us and asked us to go back into the retail field. They realize that without our leadership, our educational and sales promotional effort, they were totally unequal to the job. The dealer cannot and should not be expected to do the job.

The pioneering of specialty appliances like storage water heaters, refrigerators, etc., and the maintenance of a high quality standard on more acceptable appliances is a costly job and it certainly is out of the question for a dealer to do it adequately and profitably. The job only becomes profitable to the dealer when he can benefit by the opportunities created by our own sales activities. Cooperative advertising and sales assistance to the dealers are all good and perfectly proper things for us to do, but the only sure way to pioneer appliances is to secure satisfied users of these new appliances. Every utility merchandiser knows that important as these measures are in themselves, you cannot pioneer appliances by featuring low prices or putting in window displays, expecting the public to come in and take your equipment away. On the contrary, it takes well-trained salesmen, expertly directed to secure any worthwhile volume of this business. Very few dealers can afford to do this pioneering work.

While discussing this question of salesmen, allow me to say that the major portion of our dealer-stimulated political troubles is due primarily to our sales compensatory policies. In far too many instances in using volume of appliance sales as the measuring stick, we find that the gas company salesmen are paid to take appliance sales away from dealers. Theoretically, we may feel that this is not so, but on the firing line, when a salesman's income depends directly on whether or not he sells his appliance, his loyalty is being stretched too far when we expect him to stand by supinely and surrender his own commissions to a dealer to sell as good an appliance load-builder as his.

Tell Story of Gas to Trade Bodies

The big curse of measuring the success of a merchandising department in terms of its sales of appliances in dollars and cents and with its compensation plans patterned accordingly is that it is too restrictive in its general effects. It intensifies competition where there should be cooperation in the sale of an appliance. It tends to discourage dealer cooperation and nullify most of the potential benefits of favorable trade relations. It is also restrictive to the manufacturing group; these manufacturers have a most important place in this picture and any utility policy that restricts opportunities for all manufacturers of quality equipment in any particular field is restrictive as far as the better interests of the utility are concerned. The utility, by limiting its efforts to the products of one or two manufacturers, to all intents and purposes throws an undue proportion of the total available

(Continued on page 479)

MANUFACTURERS' SECTION

JOHN A. FRY, Chairman J. SCOTT FOWLER, Vice-Chairman C. W. BERGHORN, Secretary MERRILL N. DAVIS, Vice-Chairman

Gas Industry Displays At National Metal Exposition

By J. A. Malone

Chairman, Display and Contact Committee

THE gas industry was well represented at the National Metal Exposition in Detroit, October 2-6, 1933. This Exposition, which is an annual event, is of interest to all industrial men, but particularly to those in the metal trades. The Exposition, often called the "Steel Treaters' Show," was held under the auspices of the American Society for Steel Treating, in collaboration with the American Welding Society, the Wire Association, and the Institute of Metals Division and the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers.

View of exhibits at National Metal Exposition

The Display and Contact Committee of the American Gas Association, in cooperation with the Detroit City Gas Company, arranged for a varied and interesting display of industrial gas equipment, occupying a "Gas Industry Exhibit" space totalling 5,500 square feet of booth area, this being about 15 per cent of the total booth area in the Convention Hall, where this Exposition was held.

Fourteen different manufacturers of gas equipment had their individual displays, and in addition the Detroit City Gas Company arranged a display of a wide variety of metal products from many plants using gas as their fuel. The American Gas Association also had a booth, used as a general information headquarters, and in this same booth was displayed a new magnetic weld testing device developed at the American Gas Association Laboratory.

In addition to many new appliances shown by the manufacturers of industrial gas equipment, there were several exhibitors new to the "Steel Treaters' Show," among these being Electrolux Refrigerator Sales, Inc., with water coolers and refrigerators, General Gas Light Company, with several types of gas unit heaters suitable for factories and offices, and the Kompak Company, with a new type of automatic forced feed water heater for large volume use.

The wholehearted cooperation of the displaying manufacturers contributed largely to the success of the gas industry exhibit. The booths were equipped with latest types of appliances, well arranged and each manufacturer had a staff of representatives in attendance at all times. The manufacturers exhibiting were:

American Gas Furnace Company, Bellevue Furnace Company, Electrolux Refrigerator Sales, Inc., Ensign-Reynolds, Inc., General Gas Light Company, Charles A. Hones, Inc., C. M. Kemp Manufacturing Company, The Kompak Company, Paul Maehler Company, Partlow Corporation, Selas Company, Standard Fuel Engineering Company, Surface Combustion Corporation, Weldit Acetylene Company.

Another glimpse of Detroit Exhibition

American Gas Furnace Company

This company featured an all-purpose bell type retort furnace for gas carburizing, nitriding and Ni-Carb case treatment, also bright annealing, hardening, tempering, etc. In addition there was shown a new continuous shaker muffle type heat treating machine for continuously heat treating in a gaseous atmosphere. A newly developed automatic temperature control of unique design was also shown, in addition to various special and standard burners in actual operation.

Bellevue Furnace Company

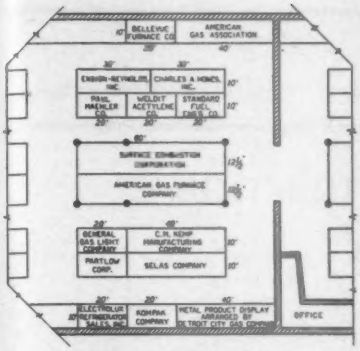
This company showed a high-speed furnace in operation at 2,250° F. with a new type refractory lining. This company also showed different kinds of high-temperature refractories in many special shapes. Various gas burners and a soldering furnace were also displayed.

Electrolux Refrigerator Sales, Inc.

Not only the now familiar domestic gas refrigerators of the air-cooled models, but the very attractive gas water coolers suitable for factory and office water cooling were shown by Electrolux Refrigerator Sales.

Ensign-Reynolds, Inc.

This company showed a new type dual-heated stereotype furnace equipped with a Duplex pump and Duplex casting box. The equipment was in actual operation



Layout of Gas Industry Exhibit, National Metal Exposition

casting stereotype plates through the co-operation of the Duplex Printing Press Company of Battle Creek, Michigan. A special display table also showed high-pressure gas burners and compressor, semi high-pressure burners with fan type booster and atmospheric burners in operation. A soldering furnace and various burners and inspirators completed this display.

General Gas Light Company

Two sizes of the Humphrey Unit Heater suitable for large factories were shown, and in addition two sizes of the Ambassador Automatic Forced Air Heater. There was also shown a floor type unit heater of new design.

Charles A. Hones, Inc.

This display consisted of bench and soldering furnaces, soft metal furnaces and a number of industrial gas burners. An interesting display in this booth was a small gas-fired immersion tank operated with an atmospheric burner.

C. M. Kemp Manufacturing Company

This company had its usual interesting display which included the Kemp Industrial Carbureter and immersion heated metal pot with automatic charging and discharging equipment. This exhibit attracted a considerable amount of attention. An automobile engine was set up for block operation, running on a Kemp premix. Gas was shown burning under water and various types of immersion heating equipment and different burners for process heating operations were shown.

Kompak Company

The Kompak Company showed its new large volume water heater with automatic control and forced feed of the water in addition to a fan draft for flue products. This heater was connected to a one hundred gallon copper tank and drew interest on account of its condensed design for large output.

Paul Maehler Company

The Maehler Universal Oven Heater was the feature in this booth and it was stated that considerable development of this heater along the lines of higher temperatures for the heated air has increased its range of application. Air temperatures as high as 1,200° are stated to be possible.

Partlow Corporation

New types of safety, automatic shut-off and temperature controls were shown by The Partlow Corporation in a complete display that covered almost every kind of pilot, temperature control and automatic shutoff device. The display was arranged in such a way that all equipment could be readily operated. New shutoffs of greater sensitivity and accuracy of control than heretofore available were shown in this exhibit.

Selas Company

This Company showed the Selas Spearflame burner, gas air mixing equipment, rapid combustion burners and high pressure gas burners, from 10 to 15,000 cu.ft. hourly capacity. A moulding platen and soldering furnace completed this display.

Standard Fuel Engineering Company

This Company displayed a small type oven furnace, also a patenting furnace in addition to a varied line of refractory materials.

Surface Combustion Corporation

The principal items in this display were a high pressure air heater for drying and japanning work, and an atmospheric muffle type furnace on high speed steel using light weight insulating fire-brick. A diffusion flame furnace was set up and in operation and attracted a great deal of attention. This furnace demonstrated the characteristic luminous flame and was equipped to give a recuperating effect by a somewhat novel arrangement. A model of the burners was available showing how the gas blanketing was produced. An improved air heater with new control was displayed.

Products displayed included miscellaneous parts heat treated in atmospheric furnaces, and also included bright annealed parts.

Weldit Acetylene Company

This booth drew a good deal of attention by the demonstration of a citigas and oxygen shape cutting machine which cut steel pieces of various thicknesses into different complicated shapes. Cutting torches and a citigas and compressed air automatic heating torch were also shown.

The product display arranged by the Detroit City Gas Company attracted a considerable amount of attention. These exhibits were laid out on tables which were arranged by types of product, under the following headings:

Forged tube products, precision parts, forged bumpers, precision tools, trimming, brazing and soldering, heat treated products, forged products, foundry cores, non-ferreous castings, plated and galvanized parts, vitreous enameled parts, Japanned products, wire products, and extruded and die cast parts.

The gas industry exhibit as a whole was commented on as a most interesting showing, indicating as it did the steady progress made by forward-looking manufacturers, even at a time when industry was at a low ebb.

The excellence of this exhibit was the result of the full cooperation of the various manufacturers who displayed equipment, with the other cooperating interests, the Detroit City Gas Company and The American Gas Association.

Weld Test Indicator Developed at A. G. A. Laboratory

ONE of the troublesome and expensive tasks connected with the laying of gas mains, especially over long distances such as the 1,000-mile line from Texas to Chicago, is the testing of the welded joints of the sections of pipe to determine their soundness. During the past few years when extensive expansions have been made in the long-distance transmission of natural gas from the large gas fields to centers of population, the need for a suitable non-destructive method for testing welded joints has been manifest. The task of developing such a method was assigned to the A. G. A. Testing Laboratory in 1932 by the Committee on Pipe Joints of the American Gas Association.

After an extensive field survey and considerable laboratory experimentation, a small weld test indicator was developed which has proven effective in determining the soundness of welds in pipes up to ten inches in diameter. Flaws in welds such as gas pockets, slag inclusions, lack of penetration, and poor fusion of the metal, is readily detected by this instrument. Although it has not been possible to ascertain the exact nature, size and shape of flaws with the test indicator, repeated verification of their existence by subsequent tension tests and X-ray photographs, has shown the instrument to be reliable. Sufficient tests on pipes of larger diameters have not as yet been made to determine the suitability of the instrument for the testing of welds in large size pipe.

Although the use of the weld test indicator has so far been confined to laboratory tests, it is regarded as entirely practical for field use.

TECHNICAL SECTION

O. S. HAGERMAN, Chairman H. W. HARTMAN, Secretary C. A. HARRISON, Vice-Chairman

Expansion Correction of Contraction Coefficient of Orifices*

By A. Busemann

IN recent years there have been published, principally in this journal, various approximations that should cover the effect of expansion on the contraction coefficient of gas flowing through metering orifices. Here we shall report a step on the side of the exact theory which has come about through the work of Riabouchinsky[1] and Demtchenko[2] of Paris. These papers are concerned with frictionless gas flow in a single plane with unconfined jet limits. Riabouchinsky shows the way to the exact solution using any gas, though the measurement of electrical potential in a definite electric current along a prescribed curve should be classed as numerical evaluation. Demtchenko presents a pure analytical solution applying to a particular gas for which the adiabatic in the pressure-volume diagram is represented by a straight line (Hooke's law in the theory of elasticity!). However, this "Hooke's gas" supplies at the same time the first term of a series development of the expansion effect for all gases. The following equations are derived from the data of Demtchenko. F_1 is the area upstream with respect to the orifice, F_0 is the area of the orifice, F_2 the area of the jet below the orifice, p the pressure at a point of impact, p_1 the pressure at F_1, p_2 the pressure at F_2, ρ the density at the point of impact, ρ_2 the density at F_2, and k the ratio of specific heats c_p/c_v. With the auxiliary value α ($\alpha \approx \mu m$), we obtain the contraction coefficient of the unidimensional orifice (slit orifice), equation (1), with α determined from the ratio of areas m, equation (2). *(See equations No. 1 and 2.)*

Using these equations as the first term of a series development for an ideal gas, the density may be replaced by the pressure with sufficient accuracy in the following manner. *(See equation No. 3.)*

We obtain an idea of the range of validity of this equation for an ideal gas if we calculate according to Demtchenko the contraction of the Hooke's gas for the Borda nozzle, which is known for the ideal gas. *(See equations Nos. 4 and 5.)*

For the simplest case, $m = 0$, $\alpha = 0$, for example, we obtain the following series development for the ideal gas. *(See equation No. 4a.)*

If the pressure drop is less than 15%, for example, the difference between equations (4) and (4a) is less than 1%.

The theoretical contraction coefficient of the unidimensional orifice, accordingly, is to be determined for any gas over the whole pressure range according to Riabouchinsky's integration method, while a pressure range very important in practice is covered by the analytical solution according to Demtchenko. There remains, however, the question as to what gain is to be had from these for the practical interesting case of two-dimensional flow through a circular orifice in a pipe. First we may test on the slit orifice the assumptions the authors have heretofore worked with in the solution of two dimensional flow. Applying the assumptions to the Hooke's gas, we test the various assumptions very exactly; up till now this has not been possible, because the most exact evaluations have all contained calculable cases. On the other hand, we may find more exact evaluations if it turns out that none of the evaluations presented heretofore are satisfactory. The calculations necessary for testing these evaluations in unidimensional problems are, in part, so detailed that they would be of interest only to the particular investigators. Mueller,[3] Buckingham[4] and Nusselt[5] use assumptions that generalize a characteristic of the Borda nozzle,—namely, that the two and one-dimensional cases give the same contraction co-efficients for the same pressure difference if both cases agree in the contraction coefficient μ_w of the incompressible fluid and the ratio of areas m. If equation (1), applied to gas, is compared with the value it assumes for liquids ($\rho = \rho_2$), we obtain the expansion correction for the

$$\mu \equiv \frac{F_2}{F_0} = \frac{\pi}{\pi + 2\left(1 - \frac{\rho - \rho_2}{\rho}\right)\left(\frac{1}{\alpha} - \alpha\right)\tan^{-1}\alpha} \tag{1}$$

$$m \equiv \frac{F_0}{F_1} = \alpha \frac{\pi + 2\left(1 - \frac{\rho - \rho_2}{\rho}\right)\left(\frac{1}{\alpha} - \alpha\right)\tan^{-1}\alpha}{\pi - \frac{\pi}{2}\frac{\rho - \rho_2}{\rho}(1 - \alpha^2)} \tag{2}$$

$$\frac{\rho - \rho_2}{\rho} \approx \frac{1}{k}\frac{p - p_2}{p} \approx \frac{1}{k}\frac{1}{1 - \alpha^2}\frac{p_1 - p_2}{p_1} \tag{3}$$

$$\mu_b = \frac{1}{2 - \alpha - \frac{\rho - \rho_2}{\rho}(1 - \alpha)} \tag{4}$$

$$m_B = \alpha \frac{2 - \alpha - \frac{\rho - \rho_2}{\rho}(1 - \alpha)}{1 - \frac{1}{2}\frac{\rho - \rho_2}{\rho}(1 - \alpha^2)} \tag{5}$$

$$\mu_{Bo} = \frac{1}{2 - \frac{1}{k}\frac{p_1 - p_2}{p_1} - \frac{4k + 1}{3k^2}\left(\frac{p_1 - p_2}{p_1}\right)^2} \tag{4a}$$

$$E \equiv \frac{\mu}{\mu_w} = \frac{1}{1 - \frac{1 - \mu_0}{1 - \mu_w^2 m^2}\frac{1}{k}\frac{p_1 - p_2}{p_1}} \tag{6}$$

* Translated from Forschung 4, 186-7 (1933). "Die Expansionberichtigung der Kontractionsziffer von Blenden."

[1] D. Riabouchinsky, Comptes rendus 194, 1215 (1932).

[2] B. Demtchenko, Comptes rendus 194, 1218, 1720 (1932).

[3] H. Mueller, W. Wien and F. Harms, Handbuch der Experimentalphysik, Vol. IV, Part 1, p. 578 (Leipzig, 1931).

[4] E. Buckingham, Forschung 2, 185 (1931); 3, 24 (1932).

[5] W. Nusselt, Forschung 3, 11 (1932).

Table 1
Expansion Correction for Air at $m^3 = 0.005$ and $\mu_w = 0.5970$

p_2/p_1	E *Los Angeles tests*	E *Mueller*	E *Buckingham*	E *Nusselt*	E *Equation 6*	E *Ruppel-Witte*
0.9	1.028	1.0262	1.030	1.0335	1.0297	1.032
0.8	1.062	1.0574	1.066	1.0737	1.0612	1.068
0.7	1.107	1.0954	1.112	1.1224	1.0947	1.108
0.6	1.167	1.1533	1.170	1.1827	1.1304	1.155

Hooke's gas. Then, with consideration of equation (3), we obtain from equation (1) the following value for the ideal gas up to about $p_2/p_1 = 0.8$, if α is approximated as equal to $\mu_w m$. *(See equation No. 6.)*

According to the assumptions of the above-named investigators, this equation applies not only to unidimensional but also to two-dimensional cases. In Table 1, the comparison is shown with a numerical example; the table also gives the test values of Buckingham and values from the data of Ruppel[6] and Witte,[7] with which a comparison[8] in unidimensional problems has already encountered difficulties. In the range in which equation (6) may be expected to apply, the agreement is so good that no great deviations are to be expected in an exact comparison of the evaluations of the three first-named investigators in unidimensional problems.

[6] G. Ruppel, Techn. Mech. u. Thermodyn. *1*, 151 (1930).
[7] R. Witte, Techn. Mech. u. Thermodyn. *1*, 118 (1930); Forschung *2*, 291 (1931).
[8] A. Busemann, Techn. Mech. u. Thermodyn. *1*, 338 (1930).

Gas School Opens Nov. 13 At Ames, Iowa

ABOUT 200 people are expected to take part in the thirteenth annual Gas School and Conference, conducted jointly by the Engineering Extension Service, Iowa State College, Ames, Iowa, and the Mid-West Gas Association. Sessions, which will take place at the College, will start Monday, November 13, and continue through Thursday, November 16.

Following is the tentative program:

MONDAY, NOVEMBER 13, 1933

8:00—11:00 A.M. Registration.

11:00 A.M. Address of Welcome. Outline of Course. Robt. F. Galpin, Short Course Committee Chairman.

11:30 A.M. 1:00 P.M. Luncheon.

1:00 P.M. Oil Fogging. Methods and checking results, L. W. Tuttle, Public Service Co. of Northern Illinois, Chicago, Ill.

2:15 P.M. Inspection of Exhibits.

3:30 P.M. Distribution Unaccounted-for, Stoppages and General Service Problems, W. A. Pike, Iowa Electric Light & Power, Marshalltown, Iowa.

TUESDAY, NOVEMBER 14

9:00 A.M. Humidifying Gas, Mr. Hurst, C. J. Tagliabue Co., Chicago.

10:00 A.M. Inspection of Exhibits.

10:15 A.M. Problems of Changing from Artificial to Natural Gas and Their Solutions, C. E. Nordstrom, Sioux City Gas & Electric Co., Sioux City, Iowa.

11:30 A.M. 1:00 P.M. Luncheon.

1:00 P.M. Physical Gas Laws as Applied to Meters and Regulators, Alan D. MacLean, Pittsburgh Equitable Meter Co.

2:15 P.M. Inspection of Exhibits.

2:30 P.M. Welded Distribution Systems, Their Advantages and Disadvantages, Representative of Linde Air Products Co., Chicago, Ill.

WEDNESDAY, NOVEMBER 15

9:00 A.M. Diaphragms, Source, Selection, Grading and Treating for Gas Meter and Regulators for Artificial and Natural Gas, Robt. L. Klar, Des Moines Gas Co.

10:00 A.M. Inspection of Exhibits.

10:15 A.M. Pipe Corrosion, Recent Developments in Preventive Methods, A. H. Abbott, Northern States Power Co., Minneapolis, Minn.

11:30 A.M. 1:00 P.M. Luncheon.

1:00 P.M. Meter Testing and Proving—Effects of Temperature on Accuracy—Air Conditioning of Meter Testing Rooms, C. B. Dushane, American Meter Co., Chicago, Ill.

2:15 P.M. Inspection of Exhibits.

3:15 P.M. Open Question Hour.

6:30 P.M. Banquet and entertainment, C. I. Merrick, Chairman, Iowa Electric Light & Power Co., Ames, Iowa.

THURSDAY, NOVEMBER 16

9:00 A.M. Use of Natural Gas for power purposes, L. J. Eck, Minneapolis Gas Light Co.

10:00 A.M. New Developments in Stand-By Equipment and a Substitute Gas for Natural, Arnold Rathkey, Iowa Public Service Co.

Earns A. G. A. Scholarship at Johns Hopkins

B. G. WOBBEKING, of Baltimore, Md., has been appointed to the full American Gas Association scholarship at Johns Hopkins University for the scholastic year 1933-34. During the preceding years he held one-half of the A. G. A. scholarship.

B. G. Wobbeking

Mr. Wobbeking, a native of Baltimore, where he was born in 1909, left public school at the age of thirteen years and completed the equivalent of high school training by studying scientific courses at Y. M. C. A. Night School. Before his admission to Johns Hopkins it was necessary for him to matriculate by passing the entrance examinations, which he did successfully, and entered the Department of Gas Engineering in 1930. He expects to graduate in 1934.

A. G. A. Members to Exhibit at Chemical Show

THE Fourteenth Exposition of Chemical Industries will open at the Grand Central Palace, New York, N. Y., December 4. Among the exhibitors are the following manufacturer members of the American Gas Association:

American Meter Co., Bailey Meter Co., Baker Perkins Co. Inc., Beach-Russ Co., Bristol Co., Foxboro Co., General Ceramics Co., International Nickel Co., Johns-Manville Corp., Linde Air Products Co., Merco Nordstrom Valve Co., National Tube Co., Pittsburgh Equitable Meter Co., and Wheeling Corrugating Co.

Oklahoma Production Reaches High Figure

THE United States Bureau of Mines Petroleum Engineers, after weeks of investigation, estimate that the Oklahoma City, Oklahoma, field has produced 1,172,810,448,000 cubic feet of gas since its discovery in December, 1928. The field has produced 160,000,000 barrels of oil which brings the average gas-oil ratio between 1,000 and 8,000 feet to the barrel of oil. It is estimated the field has 95,000,000,000 feet of gas in recoverable reserve.

Joins National Meter

J. A. McBRIDE, assistant engineer of gas distribution, United Engineers & Constructors Inc., Philadelphia, Pa., has resigned to become sales engineer of the National Meter Company. Mr. McBride, who has become well-known in the gas industry since 1924, will represent the meter company nationally.

Monthly Summary of Gas Company Statistics

FOR MONTH OF AUGUST, 1933

Issued October, 1933, by the Statistical Department of the American Gas Association
420 Lexington Avenue, New York, N. Y.

PAUL RYAN, Statistician

COMPARATIVE DATA ON THE MANUFACTURED AND NATURAL GAS INDUSTRY FOR THE MONTH OF AUGUST, 1933

	Month of August			Eight Months Ending August 31		
	1933	1932	Per cent Change	1933	1932	Per cent Change
Customers						
Domestic (Including House Heating)	14,334,000	14,634,300	— 2.1			
Industrial and Commercial	931,300	940,300	— 1.0	*See August*		
Total	15,265,300	15,574,600	— 2.0			
Revenue (Dollars)						
Domestic (Including House Heating)	31,210,500	33,205,700	— 6.0	334,700,100	363,000,700	— 7.8
Industrial and Commercial	14,264,400	12,982,100	+ 9.9	123,558,500	130,185,400	— 5.1
Total	45,474,900	46,187,800	— 1.5	458,258,600	493,186,100	— 7.1

COMPARATIVE DATA ON THE MANUFACTURED GAS INDUSTRY FOR THE MONTH OF AUGUST, 1933

Customers						
Domestic	9,364,600	9,615,900	— 2.6			
House Heating	44,400	46,200	— 3.9			
Industrial and Commercial	480,800	485,300	— 0.9	*See August*		
Miscellaneous	7,200	7,200	—			
Total	9,897,000	10,154,600	— 2.5			
Gas Sales (MCF)						
Domestic	18,610,100	19,519,100	— 4.7	164,690,900	179,412,600	— 8.2
House Heating	194,800	177,400	+ 9.8	14,948,600	15,353,600	— 2.6
Industrial and Commercial	6,828,400	5,778,400	+18.2	53,825,300	55,581,200	— 3.2
Miscellaneous	121,200	133,000	—	1,224,800	1,302,500	—
Total	25,754,500	25,607,900	+ 0.6	234,689,600	251,649,900	— 6.7
Revenue (Dollars)						
Domestic	22,592,700	24,219,500	— 6.7	196,597,000	216,316,000	— 9.1
House Heating	171,600	162,800	+ 5.4	10,282,400	11,464,500	—10.3
Industrial and Commercial	5,315,900	5,208,400	+ 2.1	44,785,700	49,480,300	— 9.5
Miscellaneous	85,400	96,500	—	880,400	917,700	—
Total	28,165,600	29,687,200	— 5.1	252,545,500	278,178,500	— 9.2

COMPARATIVE DATA ON THE NATURAL GAS INDUSTRY FOR THE MONTH OF AUGUST, 1933

Customers						
Domestic (Including House Heating)	4,925,000	4,972,200	— 0.9			
Commercial	423,400	427,900	— 1.1			
Industrial	14,300	14,200	+ 0.7	*See August*		
Main Line Industrial	4,200	4,300	— 2.3			
Miscellaneous	1,400	1,400	—			
Total	5,368,300	5,420,000	— 1.0			
Gas Sales (MCF)						
Domestic (Including House Heating)	7,626,500	8,033,600	— 5.1	187,639,000	197,644,900	— 5.1
Commercial	3,749,900	3,687,900	+ 1.7	58,290,200	58,762,800	— 0.8
Industrial	33,216,900	27,920,400	+19.0	222,717,500	220,222,400	+ 1.1
Main Line Industrial	9,671,500	8,326,300	+16.2	82,890,300	72,671,700	+14.1
Miscellaneous	710,300	580,700	—	5,697,600	5,981,000	—
Total	54,975,100	48,548,900	+13.2	557,234,600	555,282,800	+ 0.4
Revenue (Dollars)						
Domestic (Including House Heating)	8,446,200	8,823,400	— 4.3	127,820,700	135,220,200	— 5.5
Commercial	1,900,600	1,856,000	+ 2.4	26,565,700	27,527,600	— 3.5
Industrial	5,875,800	4,840,800	+21.4	41,563,000	42,918,300	— 3.2
Main Line Industrial	977,000	903,300	+ 8.2	8,826,200	8,424,200	+ 4.8
Miscellaneous	109,700	77,100	—	937,500	917,300	—
Total	17,309,300	16,500,600	+ 4.9	205,713,100	215,007,600	— 4.3

Gas Revenues Reach $458,258,600 in 8 Months

DURING the first eight months of the current year revenues of manufactured and natural gas utilities declined 7 per cent, dropping from $493,186,100 in the first eight months of 1932 to $458,258,600 in the corresponding period of 1933.

The manufactured gas companies reported revenues of $252,545,500 for the first eight months, or 9.2 per cent less than for the same period of the preceding year, while revenues of the natural gas utilities aggregated $205,713,100, a decline of 4.3 per cent.

Sales of manufactured gas reported for the eight-month period totalled 234,689,600,000 cubic feet, a loss of 6.7 per cent, while natural gas sales were 557,234,600,000 cubic feet, or approximately the same as for the corresponding period of the preceding year.

This decline in sales and revenue appeared to characterize practically all sections of the country served with manufactured gas. In regions served with natural gas however, the decline in sales and revenues was relatively much less severe, owing to marked expansion in sales of gas for industrial uses.

In New York State, sales of natural gas for industrial uses increased 50 per cent during the first eight months of 1933, while in the States of Pennsylvania and Ohio the gain in this class of business was 8 per cent and 23 per cent respectively. Some States in the Mid-Continent area also reported pronounced gains, industrial sales of natural gas in Oklahoma gaining 23 per cent during the eight-month period.

What Price New Business?

(Continued from page 473)

business to those one or two manufacturers at the expense of those other manufacturers who are both willing and able to do a job but only with the utility support now given to their competitors. This broadening of the field will also broaden the scope of the manufacturers' advertising, and through the media of trade magazines published primarily for allied trades, bring the story of gas and the opportunities going with the sale of gas equipment to these trade bodies. A broadening of the field even at the comparatively insignificant sacrifice of merchandise sales volume will bring additional installation and service work to allied trades and thereby strengthen the entire industry.

To meet the intense competition of the immediate future, we must adopt policies which will take full advantage of every gas sales promotional weapon available. It should be fundamental from the executive viewpoint that an approved appliance will give the gas company just as much added revenue, whether sold by the gas company or someone else. The efforts of a utility appliance sales department can, therefore, properly be measured in terms of estimated added revenue accruing from its own sales and those of cooperating dealers and manufacturers in the territory served by the utility. The members of it should be appraised and paid accordingly. It removes the political back-lash, for it effectively squashes those very things on which most of this sort of political opposition is based.

What I have said on this general subject is particularly true of the gas business, far more so than of the electric. In the electric end, we have a less critical condition. Electric appliances are much easier to sell. We have nothing in the gas business equivalent to the hundreds of small electric appliances that are sold in all kinds of retail outlets from corner drug stores to music shops. Even in the equivalent fields such as refrigeration, for example, the popularity of the electric refrigerator induced by manufacturer's sales promotional budgets, themselves larger than the gross revenue of all our gas refrigerator manufacturers, insures their continued sale whether the central station retails them or not. There is no such parallel in the gas field.

Proposed A. G. A. Listing Requirements

(Continued from page 463)

water; those pertaining to temperature relief valves or temperature relief elements of combination valves treat relieving temperatures, discharge capacities, reseating temperatures, leakage and resistance to deterioration by hot water. Shut-off temperature, capacity, and leakage of gas and/or water, prove to be the critical items affecting the operation of gas shut-off valves; while relieving vacuum, capacity, leakage of water, and resistance to deterioration by hot water, constitute the selected indices of vacuum relief valve performance.

Domestic gas pressure regulators are chiefly considered from the standpoints of capacity, regulation, and continued operation (100,000 cycles); electric gas-control valves from the standpoints of gas leakage, capacity, continued operation (25,000 to 100,000 cycles), noisiness, durability of the electrical mechanism, and operation under variable voltage; and diaphragm gas valves from the standpoints of gas leakage, capacity, and continued operation (100,000 cycles). All types of control accessories are accorded rigid constructional tests and inspections.

It must be remembered that all listing requirements represent *minimum* standards for satisfactory performance, safe operation, and substantial and durable construction of gas appliance accessories, and neither preclude the embodiment of ingenuity of design and improvement nor constitute a measure of quality beyond compliance therewith. It is not anticipated that compliance with these submitted listing requirements will insure safe and satisfactory operation of accessories under *any and all* conditions. However, when accessories are used for the purpose *for which they are designed and sold,* and when, in addition, they comply with the proposed standards, perfectly satisfactory performance will result. Thus, although it is realized that the function of a gas appliance accessory is often radically influenced by both the appliance and the manner of installation, the new "listing" requirements should serve to assist manufacturers in developing better equipment, lessen service calls, and in general contribute to better gas service in the home and factory.

Denies Rehearing in Kansas Case

The Kansas Supreme Court, September 29, denied a rehearing in the anti-merchandising cases which had been brought in the name of ten Gas Service Company subsidiary companies in Kansas. Motion for a rehearing had been filed by Roland Boynton, attorney general.

The law passed by the 1931 Kansas Legislature was held unconstitutional by the Kansas Supreme Court last July after the Shawnee County District Court had held it valid.

The Gas Service Company was given all of the credit for successfully appealing the case and proving that the law was unconstitutional.

Any utility in Kansas may now return to merchandising activities. The Gas Service subsidiary companies have been merchandising appliances during the time the case was in the courts by operating under an injunction.

1933 Convention Papers and Reports Available in Pamphlet Form

GENERAL

	Members	*Non-Members*
Accident Prevention, Committee Report, J. M. Orts, Chairman ..... (progress report on accident prevention work and complete statistics of gas employee accidents for the year 1932, including both manufactured and natural gas companies)	$ .20	$ .40
Employee Relations, Committee Report, C. E. Gallagher, Chairman ..... (statement on employee educational activities of the Association together with a paper by Professor R. D. Bundy, discussing the possibilities of conference methods in the development of employees and outlining a course for foremen and supervisors)	.05	.10
Insurance, Committee Report, F. A. McHenry, Chairman ..... (review of work of committee and general discussion of problems affecting insurance of gas properties and personnel)	.10	.20
Rate Structure, Committee Report, H. D. Hancock, Chairman ..... (report on basic principles of rate structure and their application to current conditions—contains reports of subcommittees on domestic gas rates, thermal gas rates, effect of change in rate form, and report to National Directing Committee of Executives)	.25	.50
Industrial Gas Research, Committee Report, F. J. Rutledge, Chairman ..... (summaries of research and development projects in the industrial gas field including application of heat to ceramic firing, elimination of noises in industrial gas burners, fundamentals of combustion space requirements in high temperature furnaces, house cooling and summer air conditioning, factors affecting short cycle malleableizing, and scaling of steel at heat-treating temperatures)	.15	.30

ACCOUNTING SECTION

Accounting Machine, Committee Report, C. E. Eble, Chairman	.35	.70
Cost of Printing and Addressing Service Bills, Edwin F. Embree. (comprehensive study of developments in mechanical office equipment together with fundamental feature charts comparing various machines of national distribution generally used by utility companies—also subcommittee report on cost of printing and addressing service bills)		
"Wrinkles" compiled by Accounting Machines Committee, C. E. Eble, Chairman (compilation of efficient accounting methods, short-cuts or innovations which have resulted in improved quality of work and in saving of time and labor)	.25	.50
Customer Relations, Committee Report, H. A. Ehrmann, Chairman	$ .10	$ .20
Improving Customer Relations Through Bill Investigations, F. L. Hallock (analysis of causes of high bill complaints, methods of handling and organization)		
Information on Customer's Orders, Jay Barton (summary of practices of 22 companies in relation to order taking and order execution)		
General Accounting, Committee Report, M. F. Reeder, Chairman	.15	.30
Internal Auditing Controls, E. R. Rotramel (use of internal audits for maintaining and correcting departmental policies and routines)		
Preservation and Destruction of Records, F. B. Saunders (summary of rules and recommendations of various commissions and associations)		
Office Management, Committee Report, H. E. Cliff, Chairman	.35	.70
Measuring Commercial Office Work Standards, E. N. Keller (procedure for establishing office work standards and description of plans in effect in some companies)		
Standardization of Forms and Printing, P. J. Sweenie (detailed study of a form standardization program covering printing processes, paper, composition, equipment—also description of procedure of one utility company)		
Meter Reading and Collecting of Accounts (Portsmouth Gas Company, England), T. Carmichael	Free	

NATURAL GAS DEPARTMENT

The Relation Between Gas Reserves Developed and Undeveloped and Market Requirements, J. H. Dunn	$ .10	$ .20
The Development and Application of a Practical Method of Electrical Protection for Pipe Lines Against Soil Corrosion, Starr Thayer	.10	.20
Selling the Value of Natural Gas, E. M. Tharp	.10	.20
Some Legal Problems Peculiar to the Production and Transportation of Natural Gas, G. J. Neuner	.10	.20
Gas Plants as Standby for Natural Gas Transmission Lines, Frank Wills.....	.10	.20

COMMERCIAL SECTION

	Members	*Non-Members*
Appliance Servicing, Committee Report, C. E. Muehlberg, Chairman ..... (discussion of service fundamentals together with detailed description of a service policy recommended as a guide for the industry)	$ .15	$ .30
Home Service, Committee Report, Ruth Kleinmaier, Chairman ..... (review of developments in home service and reports of subcommittees, including kitchen modernization, education, inter-company development and research)	.15	.30
House Heating and Cooling, Committee Report, N. T. Branche, Chairman ..... (reports on commercial status of summer air conditioning with gas and auxiliary equipment for gas heating plants)	.10	.20
Refrigeration, Committee Report, Cyrus Barnes, Chairman ..... (statement of activities of committee and progress reports of subcommittees on wider distribution and refrigerator servicing)	.05	.10
Water Heating, Committee Report, C. E. Bennett, Chairman ..... (summary of committee activities and reports of subcommittees on the following subjects: 1. customer appliance surveys; 2. competitive fuel aspects of water heating; 3. fitting the type of automatic heater to the market; 4. employee cooperation in selling—resume of national study—; 5. formulating an advertising policy for automatic water heating)	.20	.40
The Commercial Development of the Gas Industry in Great Britain, T. P. Ridley.....	Free	

INDUSTRIAL GAS SECTION

Industrial Gas Section Committee Reports, Display & Contact with National Industrial Organizations, J. A. Malone, Chairman	$ .10	$ .20
Hotel, Restaurant and Food Products, R. H. Staniford, Chairman		
Large Volume Water Heating, C. E. Gallagher, Chairman		
Publicity, H. O. Andrew, Chairman		
Utilization Data, R. L. Manier, Chairman		
Watson House—An English Research Centre, C. A. Masterman	.10	.20

PUBLICITY AND ADVERTISING SECTION

The Pitfalls of Advertising and Advertising Men, G. W. Allen	.05	.10
Publicity and Industry, A. P. Ryan..... (an Englishman's viewpoint of advertising and publicity)	.10	.20

TECHNICAL SECTION

	Members	*Non-Members*
Chemical, Committee Report, E. J. Murphy, Chairman ..... (review of committee activities; reports on physico-chemical properties of tetralin, tetralin and naphthalene, unit processes in chemical engineering of interest to the gas industry —including extensive bibliography—; and a comparison of the activity of purifying materials)	$ .20	$ .40
Distribution, Committee Report, C. A. Harrison, Chairman	Free	
Meters, C. H. Stevick		
Pipe Coatings and Corrosion, G. H. Boyd		
Cast Iron Pipe Standards, M. I. Mix		
Pipe Joints, Subcommittee Report, Erick Larson, Chairman ..... (brief progress report)	Free	
Gas Production, Committee Report, P. E. Eddy, Chairman	.20	.40
Coke, R. E. Kruger (study of the breeze problem in a by-product coke-oven plant)		
Carbonization and By-Products, C. R. Locke (study of the underfiring of coke ovens by gases and mixtures of gases other than those for which the ovens were designed)		
Water Gas, L. J. Eck (new methods of producing high B.t.u. gas in present water gas generating equipment, papers on recirculated oil gas process, Davis reforming process, and gas mixing in St. Louis County)		
Builders' Section, C. I. Tenney, Chairman (reports of manufacturers of gas equipment covering new developments and processes)	Free	
Gas, Coke and By-Product Making Properties of American Coals (Gas Production Sub-Committee Report), J. S. Haug, Chairman (progress report reviewing the activities of the committee and the results of studies of various coals)	Free	
Tentative Requirements—Mechanical Joints, Erick Larson	Free	
Tentative Requirements—Bell Joint Clamps, Erick Larson	Free	
The Preparation of Coke for the London Market, F. M. Birks	Free	
The Development of a Non-Stop Pilot Control, E. J. Brady	.15	.30
The Gum Problem—Recent Developments, W. H. Fulweiler.....	.15	.30
Gas Purification and Ammonium Sulphate Manufacture, Fred Denig	.15	.30
Liquid Purification of Gas and Some Recent Developments, Fred Denig and A. R. Powell	.15	.30
Summary of Activities of Chemical Committee, E. J. Murphy	Free	
Review of Developments in Distribution, C. A. Harrison	Free	
Developments in Gas Production, P. E. Eddy	Free	

AMERICAN GAS ASSOCIATION

420 Lexington Avenue **New York, N. Y.**

NATURAL GAS DEPARTMENT

FRANK L. CHASE, Chairman A. E. HIGGINS, Secretary JOHN B. TONKIN, Vice-Chairman

Safety Precautions in Compressor Station Operation and Maintenance

By J. Ralph Sharp

Consolidated Gas Utilities Co.,
Oklahoma City, Okla.

DUE to improved methods of construction, better pipe work, packing and gaskets, the use of welding, elimination of screwed joints and greater care given towards maintenance, gas leakage in and around compressor stations has been reduced to a minimum, which, to some extent, has led to the assumption that danger in the operation and maintenance of a compressor station is non-existent. It is still a potential danger, and all rules regarding smoking, keeping fires and matches away from the premises should be rigidly enforced. There are many other major and minor rules and precautionary measures that should be followed and enforced.

No workman should be allowed to do work on any apparatus or machine below floor level under conditions where gas may escape, unless attended by someone not exposed to the risk.

All moving objects on machines, motors, engines and other apparatus should be well protected by metal guards.

Continuous inspections should be made of all pressure gauges, engine speed indicators, packings, valves and gates. Overspeeding of engines and fly-wheels court disaster, in that it not only endangers loss of life, but loss of property also, with no mention of additional expense incurred that is ordinarily not covered by insurance. Regular inspections and various tests are made of engines by employees and insurance company inspectors to determine if wheels and parts are free from cracks, looseness or other defects.

Occasional inspection should be made of electric wiring, extension cords and switches. Chances of gas igniting from electric lights may be remote, but there is no question of the chance of ignition from a poorly maintained extension cord or switch in which short circuits may exist. When electric wiring is in sealed conduits, switches in boxes of vapor-proof type, lights in vapor-proof globes, electric motors used in heating and ventillating are hermetically sealed, and all provisions of the electric code governing this class of installation are carried out and enforced, it will lessen the hazard of fire or explosion.

Fire fighting equipment should be inspected and recharged at least twice yearly. Care should be taken that they are placed in easily accessible and advantageous positions, and where, during winter months, contents will not be frozen. In many instances where electric current is purchased from power companies, caution should be exercised to see that proper kind of fire extinguisher made for the purpose of fighting an electrical fire is installed near the switchboard. This may prevent a serious if not fatal injury in case of fire in switchboard. All doors on structures should be hung so as to swing out, enabling quicker exit, as in public assembly halls.

If engines and other equipment are overhauled at regular intervals, it not only is a precaution against accident, but promotes greater operating efficiency as well.

Cleanliness in and around the premises not only adds to the appearance, but will be an aid to fire and accident prevention. Elimination of an accumulation of rubbish will help prevent an outside fire, while guarding against an accumulation of oily rags and waste will prevent spontaneous combustion. Oil or grease should never be allowed to accumulate on the floor in the slightest quantity. For, should anyone slip or fall on a concrete floor or against a metal object the result might prove serious temporarily, if not fatal.

When inspection of water tanks, cooling towers and other elevated equipment is required no employee likely to suffer from dizziness, nausea, or fear should be allowed to make such inspection from a high elevation.

Each plant should be equipped with a complete and sufficiently large first-aid kit, containing such articles as would be required to temporarily take care of any emergency that might arise until proper medical treatment could be provided.

Bulletin boards should be provided and placed in a space that would be easily seen for the purpose of placing the various kinds of pictures of accidents and suggestions for prevention. These are usually furnished by insurance companies in an effort to promote "Safety First."

Selection of employees is highly important. Only men who are dependable, conscientious and of a congenial nature should be chosen and given the responsibility in the operation and maintenance of a compressor station. Men that are shiftless, with an inclination to be careless or clumsy, should never hold a position of any nature in or near a plant, for sooner or later, they will be injured or cause an injury to another.

An employee should be cautioned and must realize at all times the ever-present danger and hazard in the operation and maintenance of a compressor station. He must understand when he exposes himself to danger, he not only is likely to suffer, but his fellow workers, their families and the employer may suffer also. Feeling their responsibility, they will take a pride in seeing their particular job carried through each day without mishap.

All employees should be taught by practice to be able to render first-aid treatment in all phases, from taking care of a scratched finger to resuscitation after asphyxiation.

A large number of hazards of dangers in the handling of natural gas can be eliminated by the use of common sense and watching minor things that might ordinarily cause an accident. Safety can be maintained by keeping each situation in mind and correcting the smaller things which have been done or left undone by reason of thoughtlessness or carelessness.

This is the third of a series of articles prepared under the auspices of the Accident Prevention Committee of the American Gas Association in a cooperative effort with the National Safety Council to develop greater publicity on the safety practices in the natural gas industry.

Installs Natural Gas Standby Plant

TEXAS Cities Gas Company has completed installation of natural gas standby equipment at its El Paso plant, at a cost of about $6,000.00. According to R. S. Reading, El Paso, manager of Texas Cities Gas, service can be switched to the standby equipment within three hours. Storage of 1,700,000 M cu.ft. is maintained at El Paso, which would be more than adequate to keep the city on gas while the standby plant was being put into operation.

Associations Affiliated with A. G. A.

Canadian Gas Association
Pres.—Donald G. Munroe, Montreal Coke & Mfg. Co., Montreal, Que.
Sec.-Tr.—G. W. Allen, 21 Astley Avenue, Toronto.

Empire State Gas and Electric Association
Pres.—Alfred H. Schoellkopf, Niagara Hudson Power Corp., Buffalo, N. Y.
Chairman, Gas Section—A. M. Beebee, Rochester Gas & Electric Corp., Rochester, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.

Illinois Public Utilities Association
Pres.—Bernard J. Mullaney, The Peoples Gas Light & Coke Company, Chicago, Ill.
Sec.—J. R. Blackhall, Suite 1213, 79 West Monroe St., Chicago, Ill.

Indiana Gas Association
Pres.—R. S. Brunner, Indiana Gas Utilities Co., Richmond, Ind.
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Mid-West Gas Association
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Missouri Association of Public Utilities
Pres.—Fred Karr, St. Joseph Gas Co., St. Joseph, Mo.
Sec.-Tr.—N. R. Beagle, Missouri Power & Light Co., Jefferson City, Mo.
Asst. Sec.—Jesse Blythe, 103 West High St., Jefferson City, Mo.

New England Gas Association
Pres.—H. R. Sterrett, New Haven Gas Light Co., New Haven, Conn.

Exec. Sec.—Clark Belden, 41 Mt. Vernon St., Boston, Mass.

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Sec.-Tr., Operating Div.—D. R. Campbell, Portland Gas Light Co., Portland, Me.

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Sec.-Tr., Sales Div.—R. J. Rutherford, Cambridge Gas Light Co., Cambridge, Mass.

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Sec.-Tr., Industrial Div.—S. F. Morgan, New Bedford Gas & Edison Lt. Co., New Bedford, Mass.

Chairman, Accounting Div.—Leland Balch, Lowell Gas Light Co., Lowell, Mass.

Sec.-Tr., Accounting Div.—C. D. Perkins, Malden & Melrose Gas Light Co., Malden, Mass.

Chairman, Manufacturers Div.—C. H. Cummings, Industrial Appliance Co. of N. E., Boston, Mass.

Sec.-Tr., Manufacturers Div.—J. H. McPherson, James B. Clow & Sons, Boston, Mass.

New Jersey Gas Association
Pres.—F. A. Lydecker, Public Service Electric and Gas Co., Newark, N. J.

Sec.-Tr.—G. B. Webber, Public Service Electric and Gas Co., Newark, N. J.

Ohio Gas and Oil Men's Association
Pres.—L. K. Langdon, Union Gas & Electric Co., Cincinnati, Ohio.

Sec.-Tr.—Wm. H. Thompson, 811 First National Bank Bldg., Columbus, Ohio.

Oklahoma Utilities Association
Pres.—R. J. Benzel, Southwestern Bell Telephone Co., Oklahoma City, Okla.
Mgr.—E. F. McKay, 1020 Petroleum Bldg., Oklahoma City, Okla.

Pacific Coast Gas Association
Pres.—Geo. P. Egleston, H. R. Basford Co., San Francisco, Calif.
Mang. Dir.—Clifford Johnstone, 447 Sutter St., San Francisco, Calif.

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Pennsylvania Natural Gas Men's Association
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Sec.-Tr.—B. H. Smyers, Jr., 435 Sixth Ave., Pittsburgh, Pa.

Southern Gas Association
Pres.—B. B. Ferguson, Portsmouth Gas Co., Portsmouth, Va.
Sec.-Tr.—S. L. Drumm, New Orleans Public Service Inc., New Orleans, La.

Southwestern Public Service Association
Pres.—Knox Lee, Southwestern Gas & Electric Co., Marshall, Texas.
Sec.—E. N. Willis, 1801 No. Lamar St., Dallas, Texas.

The Public Utilities Association of Virginia
Pres.—T. Justin Moore, Va. Elec. & Power Co., Richmond, Va.

Wisconsin Utilities Association
Pres.—R. G. Walter, Wisconsin Power & Light Co., Madison, Wis.
Exec. Sec.—J. N. Cadby, 135 West Wells St., Milwaukee, Wis.

16th Annual Convention and Exhibition
American Gas Association
Atlantic City, N. J.
Week of
October 29, 1934

Personnel Service

SERVICES OFFERED

All around gas man (31), married, graduate **chemical engineer.** Experienced in design, construction and operation of water gas plants and high and low pressure distribution systems. Good business experience and judgment. Interested in engineering, operation, construction, sales or management. Location not important. Available immediately. **764.**

Trained young experienced aggressive leader desires position in domestic **gas sales.** Has been very successful as complete dealer appliance Sales Manager and later led the New York City market for some years in sales for a well-known range organization. Can handle industrial work. **765.**

NRA will boost your operating costs. I can boost gas-using appliance **sales** by enlisting interest and cooperation of plumbers and dealers. I know how, because of 6½ years of well-attested success in working with these men along closely similar lines. Salary ideas not cheap, but attuned to 1933. **766.**

Sales executive available. Thirteen years' experience as commercial and sales manager. Gas and electric operations in small towns and large cities. Natural gas conversion experience. Organized and trained sales personnel in domestic, commercial, house heating and industrial fields. **768.**

Gas Engineer. Technical training chemical engineering and gas and fuel engineering. Experience covers gasoline plant construction, natural gas plant construction and operation, preparation of cost accounting, depreciation studies, original cost valuation studies and Public Service Commission relations. Now available, will connect anywhere to prove ability. Married. **770.**

Sales manager—engineer. University graduate. Good general business background. Thirteen years' experience heating, ventilating, air conditioning. Industrial and residential work. Capable making own drawings, layouts, estimates, assume complete responsibility installations, credits, collections. Acquainted, architects, engineers, contractors, builders, industrial plants. Handle men successfully and remember how to sell myself. **771.**

Manager—Chief **Accountant.** Twelve years' experience assistant secretary and treasurer; three years' manager carburetted water gas property; excellent record in public relations; thoroughly experienced in new business work; budgets; cost analyses; auditing; will consider either domestic or foreign assignment. **773.**

Gas man with twenty odd years' extensive experience is available for duty **most** anywhere; **operation,** distribution, construction or new business. **774.**

Graduate Engineer (47) soundly trained as gas company cadet followed by wide combination gas and electric company experience, through engineering branches to division manager large organization. National viewpoint, very useful in holding company or **assistant** to busy executive. Can create and maintain good public relations. **778.**

Advertising man—gas company, department store, advertising agency experience. Creator of prize winning campaign. Copy, layout, merchandising man, understanding all phases of printing production, sales promotion. Married. Samples on request. **782.**

Eighteen years' experience in **domestic** gas **sales** and house heating. Capable of taking charge of sales force or would be interested in agency for gas appliance for New York and New Jersey. Have good connection with plumbers, jobbers and public utility. **783.**

Advertising, publicity, sales promotion manager: several years' successful experience as department head for large, progressive gas and electric organization; also wide experience in newspaper and magazine field. Thoroughly trained and competent in all details of practical advertising and promotional work (direct mail, etc.) and familiar with best modern public utility practice. **784.**

SERVICES OFFERED

University graduate mechanical engineer with vision, initiative, imagination, creative ability and common sense; broad experience in **management,** sales, markets, contracts and negotiating; engineering plants, equipment, inventions and patents; business cycles, business indexes and economics; and in assembling, arranging and interpreting statistics, data and conditions. **785.**

Graduate, June 1933, chemical engineering school, Purdue University, majored in gas engineering, desires connection with a utility company as **gas engineer** in operating or house heating departments or with a reliable gas appliance manufacturer. Age 23, white, single, native American. Will locate anywhere in United States. **786.**

Services of a thoroughly experienced **purchasing agent** available immediately. Excellent record. Trained in engineering and utility organizations and for fourteen years purchasing executive of efficiently organized corporation. **787.**

Auditor-accountant. Wishes placement in auditing department to assist auditor or chief accountant on corporate and operating accounts, monthly reports, etc., would consider place on field audit staff if desired. Has had extensive experience in utility accounting as traveling auditor with one of foremost supervisory and management organizations in the country. **788.**

Heating engineer. Versed in all phases of air-conditioning, conversion burners and direct-fired heating equipment as applied to the use of natural or manufactured gas. Capable of designing, selling and overseeing erection of such heating plants, can take charge of house heating department and show results. Salary and location optional. **789.**

Editor and **writer,** formerly with nationally known organizations expert in collecting, writing, and editing business material. Can do research and write articles, booklets, etc., from source data. Skilled also in rewrite work and in editing of manuscripts and proofs. **790.**

Appraisal engineer (42), American, ten years' experience with a large utility company on gas and electric valuations. Thoroughly familiar with public service commission classified system of accounts. Field inventories, unit costs and pricing practice. Technical training. **791.**

Manager-gas **engineer.** (46), married. Technical education. Twenty years' experience in construction, engineering, manufacture, distribution, finance, management, sales and public relations. Wide experience. Build up property or develop sales per year per customer. Small or large property. Modest compensation. **792.**

Accountant—twenty-two years' utilities experience. Specialty is installation and reorganization (47). **793.**

Gas **appliance specialist,** with broad experience. For past two years intimately associated with design and development of new models; ideas for new sales features, new sales plans for dealers, new outlets for business. Has proven sales, advertising and promotional ability together with contacts that will be helpful in securing business. **794.**

Engineer, nine years' broad experience in public utility work, both gas and electric, covering **management,** valuation, gas analysis, construction estimates, operating improvements, marketing studies, rates, etc. **795.**

Draftsman, twenty years' mechanical experience, machine shop, machine design, drafting general mechanical work, electrical engineering work and some field and industrial experience (40). American. **796.**

Services of experienced **appliance salesman** both through utilities and dealers, domestic and heavy duty, are offered. Wide acquaintance in the gas industry. Desire Eastern territory. Twenty-three years in the industry; fourteen years last position. Clean and successful sales record (38). Married. **797.**

SERVICES OFFERED

Gas engineer, B.S. and M.S. in gas engineering, Purdue University. Three years' experience in utility work. Desire position in engineering, operating or sales (25). Married. Will go anywhere. **798.**

Appliance salesman seeking a substantial connection. Eighteen years' experience traveling Eastern and Southern territories, contacting wholesale and retail trade, also utility companies. Ambitious and hard worker experienced and capable of taking complete charge of a territory and selling organization. Have no preference as to location. Married and in the early forties. **799.**

Air conditioning. Graduate mechanical engineer 1932 desires position in air conditioning or heating field. Two years' experience in air conditioning, heating and ventilating in office and field. Has done some research work on Silica Gel Air Conditioning Systems. Will go anywhere. Salary secondary. **800.**

Sales manager with "punch" and aggressiveness, tempered with judgment and diplomacy. Exceptionally broad experience selling gas and electric service and appliances, handling salesmen and specialists, costs, rates, franchises, advertising, publicity, commercial and public relations. Can "pep-up" your organization, introduce efficient methods, and quickly develop new business potentialities. **801.**

Reduced income of gas companies requires better and more intelligent plant control to help maintain dividends. Experienced **gas engineer** can bring to your organization or company that technical and practicable aid necessary to further reduce operating expenses to a minimum. **802.**

Executive, **salesman,** stoves, furnaces, boilers and radiation. Over twenty-five years' experience, all general office details—credits, collections, sales promotion, sales customers claims and traffic. Wide acquaintance among furniture, hardware and department store trade in Northern Ohio and Michigan. Also conducted warm air heating business on own account for several years. **803.**

Young engineering graduate with varied experience in design, manufacture, erection and operation of gas plant equipment, practical specialist in modern methods of **water gas** production engaged as supervisor of operation in plant of large city, desires similar employment in smaller community. Salary secondary. Married. **804.**

Technical graduate, 1931, single, specialized in gas and chemical engineering, with experience in several industrial concerns, also in testing **house heating** equipment; interested in development and experimental work, willing to go anywhere and to consider any position regardless of salary. **805.**

Foreman, experienced in manhole and conduit construction; also in 3-4 wire cable, emergency maps and records. Eleven years' experience in public utility work. **806.**

THE SHORT LIST

From those advertising their services and from its detailed classification records Personnel Service can provide promptly a comprehensive list of available personnel of specified qualifications.

Many organizations regularly avail themselves of this service and have expressed their satisfaction at the results obtained.

When next in the market for additional personnel let us send you a "short" list.

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